Appendix A

Residential Soil Risk Calculations and Summary Tables

Appendix A – Residential Soil Risk Calculations and Summary Tables

Lead Spread 7 Output

ProUCL Outputs

- Hayden Residential Properties
- Winkelman Residential Properties

Summary Statistics

- Hayden Residential Properties
- Winkelman Residential Properties

Risk Calculations

- Hayden Residential Properties
- Winkelman Residential Properties

Lead Spread 7 Output

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.5947
Lead in Soil/Dust (ug/g)	212.0
Lead in Water (ug/l)	8.2
% Home-grown Produce	0%
Respirable Dust (ug/m^3)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	1.9	3.4	4.0	4.9	5.6	1822	3213
BLOOD Pb, CHILD	3.3	6.1	7.2	8.8	10.0	212	392
BLOOD Pb, PICA CHILD	4.8	8.8	10.5	12.7	14.5	106	197
BLOOD Pb, OCCUPATION	1.5	2.8	3.3	4.0	4.6	3036	5025

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produ	ug/kg	95.4	

Click here for REFERENCES

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.01	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.19	10%	6.3E-4	0.13	9%
Inhalation, bkgrnd		0.98	52%		0.70	46%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.46	25%		0.46	30%
Food Ingestion, bkgrnd		0.23	13%		0.23	15%
Food Ingestion	0.0E+0	0.00	0%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.01	0%
Soil Ingestion	7.0E-3	1.49	45%	1.4E-2	2.98	62%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.78	23%		0.78	16%
Water Ingestion		0.52	16%		0.52	11%
Food Ingestion, bkgrnd		0.54	16%		0.54	11%
Food Ingestion	0.0E+0	0.00	0%		0.00	0%

excludes homegrown produce

LEAD RISK ASSESSMENT SPREADSHEET
CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.5947
Lead in Soil/Dust (ug/g)	122.0
Lead in Water (ug/l)	8.2
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	2.1	3.8	4.4	5.4	6.1	511	897
BLOOD Pb, CHILD	3.3	6.1	7.2	8.8	10.0	122	223
BLOOD Pb, PICA CHILD	4.2	7.7	9.1	11.0	12.6	78	143
BLOOD Pb, OCCUPATION	1.5	2.7	3.2	3.9	4.4	3036	5025

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produ	ug/kg	54.9	

Click here for REFERENCES

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.00	0%	1.4E-5	0.00	0%
Soil Ingestion	8.8E-4	0.11	5%	6.3E-4	0.08	5%
Inhalation, bkgrnd		0.98	47%		0.70	47%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.46	22%		0.46	31%
Food Ingestion, bkgrnd		0.22	11%		0.23	16%
Food Ingestion	2.4E-3	0.29	14%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.01	0%		0.01	0%
Soil Ingestion	7.0E-3	0.86	26%	1.4E-2	1.72	41%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.78	23%		0.78	18%
Water Ingestion		0.52	16%		0.52	12%
Food Ingestion, bkgrnd		0.50	15%		0.50	12%
Food Ingestion	5.5E-3	0.68	20%		0.68	16%

homegrown produce

ProUCL Outputs
Hayden Residential Properties

Table of Contents for ProUCL Outputs

Baseline Human Health Risk Assessment

Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL #	Parcel	Zone	Parameter
1	101-07-185C	1	Arsenic
2	101-07-185C	1	Copper
3	101-07-185C	1	Lead
4	101-07-193A	1	Arsenic
5	101-07-193A	1	Copper
6	101-07-193A	1	Lead
7	101-07-216	1	Arsenic
8	101-07-216	1	Copper
9	101-07-216	1	Lead
10	101-07-176	2	Arsenic
11	101-07-176	2	Copper
12	101-07-176	2	Lead
13	101-07-202	2	Arsenic
14	101-07-202	2	Copper
15	101-07-202	2	Lead
16	101-07-242	2	Arsenic
17	101-07-242	2	Copper
18	101-07-242	2	Lead
19	101-07-244	2	Arsenic
20	101-07-244	2	Copper
21	101-07-244	2	Lead
22	101-07-247	2	Arsenic
23	101-07-247	2	Copper
24	101-07-247	2	Lead
25	101-07-219	3	Arsenic
26	101-07-219	3	Copper
27	101-07-219	3	Lead
28	101-07-234	3	Arsenic
29	101-07-234	3	Copper
30	101-07-234	3	Lead
31	101-07-236	3	Arsenic
32	101-07-236	3	Copper
33	101-07-236	3	Lead
34	101-07-142A	4	Arsenic
35	101-07-142A	4	Copper
36	101-07-142A	4	Lead
37	101-07-149	4	Arsenic
38	101-07-149	4	Copper
39	101-07-149	4	Lead
40	101-07-251	4	Arsenic
41	101-07-251	4	Copper
42	101-07-251	4	Lead
43	101-07-259	4	Arsenic
44	101-07-259	4	Copper
45	101-07-259	4	Lead

Table of Contents for ProUCL Outputs

Baseline Human Health Risk Assessment

Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL #	Parcel	Zone	Parameter
46	101-07-129	5	Arsenic
47	101-07-129	5	Copper
48	101-07-129	5	Lead
49	101-07-301	5	Arsenic
50	101-07-301	5	Copper
51	101-07-301	5	Lead
52	101-07-303	5	Arsenic
53	101-07-303	5	Copper
54	101-07-303	5	Lead
55	101-07-304A	5	Arsenic
56	101-07-304A	5	Copper
57	101-07-304A	5	Lead
58	101-07-111	6	Arsenic
59	101-07-111	6	Copper
60	101-07-111	6	Lead
61	101-07-117	6	Arsenic
62	101-07-117	6	Copper
63	101-07-117	6	Lead
64	101-07-284	6	Arsenic
65	101-07-284	6	Copper
66	101-07-284	6	Lead
67	101-07-286	6	Arsenic
68	101-07-286	6	Copper
69	101-07-286	6	Lead
70	101-07-099	7	Arsenic
71	101-07-099	7	Copper
72	101-07-099	7	Lead
73	101-07-104	7	Arsenic
74	101-07-104	7	Copper
75	101-07-104	7	Lead
76	101-07-270	7	Arsenic
77	101-07-270	7	Copper
78	101-07-270	7	Lead
79	101-07-090	8	Arsenic
80	101-07-090	8	Copper
81	101-07-090	8	Lead
82	101-07-091	8	Arsenic
83	101-07-091	8	Copper
84	101-07-091	8	Lead
85	101-07-092A	8	Arsenic
86	101-07-092A	8	Copper
87	101-07-092A	8	Lead
88	101-07-105	8	Arsenic
89	101-07-105	8	Copper
90	101-07-105	8	Lead

Table of Contents for ProUCL Outputs

Baseline Human Health Risk Assessment

Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL #	Parcel	Zone	Parameter
91	101-07-110	8	Arsenic
92	101-07-110	8	Copper
93	101-07-110	8	Lead
94	101-07-035AN	9	Arsenic
95	101-07-035AN	9	Copper
96	101-07-035AN	9	Lead
97	101-07-037	9	Arsenic
98	101-07-037	9	Copper
99	101-07-037	9	Lead
100	101-07-040	9	Arsenic
101	101-07-040	9	Copper
102	101-07-040	9	Lead
103	101-07-052	9	Arsenic
104	101-07-052	9	Copper
105	101-07-052	9	Lead
106	101-07-060	9	Arsenic
107	101-07-060	9	Copper
108	101-07-060	9	Lead
109	101-07-061	9	Arsenic
110	101-07-061	9	Copper
111	101-07-061	9	Lead
112	101-07-062	9	Arsenic
113	101-07-062	9	Copper
114	101-07-062	9	Lead
115	101-07-089K	9	Arsenic
116	101-07-089K	9	Copper
117	101-07-089K	9	Lead
118	101-07-089Q	9	Arsenic
119	101-07-089Q	9	Copper
120	101-07-089Q	9	Lead
121	101-07-089S	9	Arsenic
122	101-07-089S	9	Copper
123	101-07-089S	9	Lead
124	101-07-089T	9	Arsenic
125	101-07-089T	9	Copper
126	101-07-089T	9	Lead
127	101-07-089U	9	Arsenic
128	101-07-089U	9	Copper
129	101-07-089U	9	Lead
130	101-07-008	10	Arsenic
131	101-07-008	10	Copper
132	101-07-008	10	Lead
133	101-07-010	10	Arsenic
134	101-07-010	10	Copper
135	101-07-010	10	Lead

Table of Contents for ProUCL Outputs

Baseline Human Health Risk Assessment

Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL #	Parcel	Zone	Parameter
136	101-07-014	10	Arsenic
137	101-07-014	10	Copper
138	101-07-014	10	Lead
139	101-07-018	10	Arsenic
140	101-07-018	10	Copper
141	101-07-018	10	Lead
142	101-07-027	10	Arsenic
143	101-07-027	10	Copper
144	101-07-027	10	Lead
145	101-07-028	10	Arsenic
146	101-07-028	10	Copper
147	101-07-028	10	Lead
148	101-07-029	10	Arsenic
149	101-07-029	10	Copper
150	101-07-029	10	Lead
151	101-07-030	10	Arsenic
152	101-07-030	10	Copper
153	101-07-030	10	Lead
154	101-07-034	10	Arsenic
155	101-07-034	10	Copper
156	101-07-034	10	Copper
157	101-07-035AE	10	Arsenic
158	101-07-035AE	10	Copper
159	101-07-035AE	10	Lead
160	101-07-035AS	10	Arsenic
161	101-07-035AS	10	Copper
162	101-07-035AS	10	Lead
163	101-07-041	10	Arsenic
164	101-07-041	10	Copper
165	101-07-041	10	Lead
166	101-07-042	10	Arsenic
167	101-07-042	10	Copper
168	101-07-042	10	Lead
169	101-07-046	10	Arsenic
170	101-07-046	10	Copper
171	101-07-046	10	Lead
172	101-07-047	10	Arsenic
173	101-07-047	10	Copper
174	101-07-047	10	Lead
175	101-07-050A	10	Arsenic
176	101-07-050A	10	Copper
177	101-07-050A	10	Lead
178	101-07-065	11	Arsenic
179	101-07-065	11	Copper
180	101-07-065	11	Lead

Table of Contents for ProUCL Outputs

Baseline Human Health Risk Assessment

Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL #	Parcel	Zone	Parameter
181	101-07-066	11	Arsenic
182	101-07-066	11	Copper
183	101-07-066	11	Lead
184	101-07-082	11	Arsenic
185	101-07-082	11	Copper
186	101-07-082	11	Lead
187	101-09-014	11	Arsenic
188	101-09-014	11	Copper
189	101-09-014	11	Lead
190	101-09-004	12	Arsenic
191	101-09-004	12	Copper
192	101-09-004	12	Lead
193	101-09-008	12	Arsenic
194	101-09-008	12	Copper
195	101-09-008	12	Lead
196	101-09-010	12	Arsenic
197	101-09-010	12	Copper
198	101-09-010	12	Lead
199	101-09-025A	12	Arsenic
200	101-09-025A	12	Copper
201	101-09-025A	12	Lead
202	101-09-027	12	Arsenic
203	101-09-027	12	Copper
204	101-09-027	12	Lead
205	101-09-032	12	Arsenic
206	101-09-032	12	Copper
207	101-09-032	12	Lead
208	101-09-033	12	Arsenic
209	101-09-033	12	Copper
210	101-09-033	12	Lead
211	101-09-059	13	Arsenic
212	101-09-059	13	Copper
213	101-09-059	13	Lead
214	101-09-062	13	Arsenic
215	101-09-062	13	Copper
216	101-09-062	13	Lead
217	101-09-064	13	Arsenic
218	101-09-064	13	Copper
219	101-09-064	13	Lead
220	101-09-067	13	Arsenic
221	101-09-067	13	Copper
222	101-09-067	13	Lead
223	101-09-068	13	Arsenic
224	101-09-068	13	Copper
225	101-09-068	13	Lead

Table of Contents for ProUCL Outputs

Baseline Human Health Risk Assessment

Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL #	Parcel	Zone	Parameter
226	101-09-070	13	Arsenic
227	101-09-070	13	Copper
228	101-09-070	13	Lead
229	101-09-072	13	Arsenic
230	101-09-072	13	Copper
231	101-09-072	13	Lead
232	101-09-036	14	Arsenic
233	101-09-036	14	Copper
234	101-09-036	14	Lead
235	101-09-038	14	Arsenic
236	101-09-038	14	Copper
237	101-09-038	14	Lead
238	101-09-039	14	Arsenic
239	101-09-039	14	Copper
240	101-09-039	14	Lead
241	101-09-042	14	Arsenic
242	101-09-042	14	Copper
243	101-09-042	14	Lead
244	101-09-045	14	Arsenic
245	101-09-045	14	Copper
246	101-09-045	14	Lead
247	101-09-047	14	Arsenic
248	101-09-047	14	Copper
249	101-09-047	14	Lead
250	101-09-054	14	Arsenic
251	101-09-054	14	Copper
252	101-09-054	14	Lead
253	101-09-077	14	Arsenic
254	101-09-077	14	Copper
255	101-09-077	14	Lead
256	101-09-083	15	Arsenic
257	101-09-083	15	Copper
258	101-09-083	15	Lead
259	101-09-084	15	Arsenic
260	101-09-084	15	Copper
261	101-09-084	15	Lead
262	101-09-088	15	Arsenic
263	101-09-088	15	Copper
264	101-09-088	15	Lead
265	101-09-134	15	Arsenic
266	101-09-134	15	Copper
267	101-09-134	15	Lead
268	101-09-104	16	Arsenic
269	101-09-104	16	Copper
270	101-09-104	16	Lead

Table of Contents for ProUCL Outputs

Baseline Human Health Risk Assessment

Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL #	Parcel	Zone	Parameter
271	101-09-106	16	Arsenic
272	101-09-106	16	Copper
273	101-09-106	16	Lead
274	101-09-107	16	Arsenic
275	101-09-107	16	Copper
276	101-09-107	16	Lead
277	101-09-108	16	Arsenic
278	101-09-108	16	Copper
279	101-09-108	16	Lead
280	101-09-109	16	Arsenic
281	101-09-109	16	Copper
282	101-09-109	16	Lead
283	101-09-111B	16	Arsenic
284	101-09-111B	16	Copper
285	101-09-111B	16	Lead
286	101-09-137	16	Arsenic
287	101-09-137	16	Copper
288	101-09-137	16	Lead
289	101-09-140	16	Arsenic
290	101-09-140	16	Copper
291	101-09-140	16	Lead
292	101-09-115	17	Arsenic
293	101-09-115	17	Copper
294	101-09-115	17	Lead
295	101-09-120	17	Arsenic
296	101-09-120	17	Copper
297	101-09-120	17	Lead

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_1	101-07-185C	1	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	6.2	Minimum of Log Data	1.825
Maximum	9.8	Maximum of Log Data	2.282
Mean	8.289	Mean of log Data	2.105
Median	8.5	SD of log Data	0.149
SD	1.184		
Coefficient of Variation	0.143		
Skewness	-0.506		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.959	Shapiro Wilk Test Statistic	0.943
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	9.023	95% H-UCL	9.163
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10.09
95% Adjusted-CLT UCL	8.867	97.5% Chebyshev (MVUE) UCL	10.87
95% Modified-t UCL	9.011	99% Chebyshev (MVUE) UCL	12.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	34.91	Data appear Normal at 5% Significance Level	
Theta Star	0.237		
nu star	628.3		
Approximate Chi Square Value (.05)	571.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	8.938
Adjusted Chi Square Value	559.7	95% Jackknife UCL	9.023
		95% Standard Bootstrap UCL	8.921
Anderson-Darling Test Statistic	0.258	95% Bootstrap-t UCL	8.984
Anderson-Darling 5% Critical Value	0.72	95% Hall's Bootstrap UCL	8.867
Kolmogorov-Smirnov Test Statistic	0.186	95% Percentile Bootstrap UCL	8.9
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	8.811
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	10.01
		97.5% Chebyshev(Mean, Sd) UCL	10.75
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	12.21
95% Approximate Gamma UCL	9.118		
95% Adjusted Gamma UCL	9.306		

Potential UCL to Use	Use 95% Student's-t UCL	9.023

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_2	101-07-185C	1	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	914	Minimum of Log Data	6.818
Maximum	2450	Maximum of Log Data	7.804
Mean	1506	Mean of log Data	7.266
Median	1290	SD of log Data	0.335
SD	526.8		
Coefficient of Variation	0.35		
Skewness	0.816		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.94
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1833	95% H-UCL	1934
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2242
95% Adjusted-CLT UCL	1846	97.5% Chebyshev (MVUE) UCL	2561
95% Modified-t UCL	1840	99% Chebyshev (MVUE) UCL	3188

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.677	Data appear Normal at 5% Significance Level	
Theta Star	225.5		
nu star	120.2		
Approximate Chi Square Value (.05)	95.88	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	1795
Adjusted Chi Square Value	91.3	95% Jackknife UCL	1833
		95% Standard Bootstrap UCL	1781
Anderson-Darling Test Statistic	0.386	95% Bootstrap-t UCL	1951
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	1844
Kolmogorov-Smirnov Test Statistic	0.199	95% Percentile Bootstrap UCL	1787
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	1815
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2271
		97.5% Chebyshev(Mean, Sd) UCL	2603
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3253
95% Approximate Gamma UCL	1888		
95% Adjusted Gamma UCL	1983		

Potential UCL to Use		Use 95% Student's-t UCL	1833

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_3	101-07-185C	1	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	30.7	Minimum of Log Data	3.424
Maximum	57.5	Maximum of Log Data	4.052
Mean	46.09	Mean of log Data	3.811
Median	47	SD of log Data	0.213
SD	9.279		
Coefficient of Variation	0.201		
Skewness	-0.33		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.932
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	51.84	95% H-UCL	53.46
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	60.4
95% Adjusted-CLT UCL	50.81	97.5% Chebyshev (MVUE) UCL	66.58
95% Modified-t UCL	51.78	99% Chebyshev (MVUE) UCL	78.72

Gamma Distribution Test		Data Distribution
k star (bias corrected)	17.43	Data appear Normal at 5% Significance Level
Theta Star	2.645	
nu star	313.7	
Approximate Chi Square Value (.05)	273.7	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 51.18
Adjusted Chi Square Value	265.8	95% Jackknife UCL 51.84
		95% Standard Bootstrap UCL 50.95
Anderson-Darling Test Statistic	0.3	95% Bootstrap-t UCL 51.9
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL 50.68
Kolmogorov-Smirnov Test Statistic	0.2	95% Percentile Bootstrap UCL 50.92
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL 50.87
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 59.57
		97.5% Chebyshev(Mean, Sd) UCL 65.41
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 76.86
95% Approximate Gamma UCL	52.83	
95% Adjusted Gamma UCL	54.4	

Potential UCL to Use	Use 95% Student's-t UCL	51.84

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_4	101-07-193A	1	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	8	Minimum of Log Data	2.079
Maximum	16.8	Maximum of Log Data	2.821
Mean	12.51	Mean of log Data	2.5
Median	11.6	SD of log Data	0.247
SD	2.969		
Coefficient of Variation	0.237		
Skewness	-0.0356		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Test Statistic	0.945
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	14.35	95% H-UCL	14.92
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	17.03
95% Adjusted-CLT UCL	14.13	97.5% Chebyshev (MVUE) UCL	18.98
95% Modified-t UCL	14.35	99% Chebyshev (MVUE) UCL	22.82

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	12.83	Data appear Normal at 5% Significance Level	
Theta Star	0.975		
nu star	231		
Approximate Chi Square Value (.05)	196.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	14.14
Adjusted Chi Square Value	190.1	95% Jackknife UCL	14.35
		95% Standard Bootstrap UCL	14.03
Anderson-Darling Test Statistic	0.306	95% Bootstrap-t UCL	14.46
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	14.09
Kolmogorov-Smirnov Test Statistic	0.214	95% Percentile Bootstrap UCL	14.12
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	14.12
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	16.82
		97.5% Chebyshev(Mean, Sd) UCL	18.69
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	22.36
95% Approximate Gamma UCL	14.68		
95% Adjusted Gamma UCL	15.2		

Potential UCL to Use	Use 95% Student's-t UCL	14.35

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_5	101-07-193A	1	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	733	Minimum of Log Data	6.597
Maximum	2430	Maximum of Log Data	7.796
Mean	1769	Mean of log Data	7.429
Median	1860	SD of log Data	0.36
SD	513.4		
Coefficient of Variation	0.29		
Skewness	-0.881		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.942	Shapiro Wilk Test Statistic	0.841
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2087	95% H-UCL	2348
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2724
95% Adjusted-CLT UCL	1997	97.5% Chebyshev (MVUE) UCL	3131
95% Modified-t UCL	2079	99% Chebyshev (MVUE) UCL	3931

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.942	Data appear Normal at 5% Significance Level	
Theta Star	254.9		
nu star	124.9		
Approximate Chi Square Value (.05)	100.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2051
Adjusted Chi Square Value	95.45	95% Jackknife UCL	2087
		95% Standard Bootstrap UCL	2028
Anderson-Darling Test Statistic	0.467	95% Bootstrap-t UCL	2038
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	2004
Kolmogorov-Smirnov Test Statistic	0.179	95% Percentile Bootstrap UCL	2032
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	2001
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2515
		97.5% Chebyshev(Mean, Sd) UCL	2838
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3472
95% Approximate Gamma UCL	2208		
95% Adjusted Gamma UCL	2316		

Potential UCL to Use		Use 95% Student's-t UCL	2087

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_6	101-07-193A	1	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	48.4	Minimum of Log Data	3.879
Maximum	173	Maximum of Log Data	5.153
Mean	94.6	Mean of log Data	4.473
Median	95	SD of log Data	0.414
SD	39.59		
Coefficient of Variation	0.418		
Skewness	0.838		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.937	Shapiro Wilk Test Statistic	0.972
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	119.1	95% H-UCL	131.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	152.1
95% Adjusted-CLT UCL	120.2	97.5% Chebyshev (MVUE) UCL	177
95% Modified-t UCL	119.8	99% Chebyshev (MVUE) UCL	225.9

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.558	Data appear Normal at 5% Significance Level	
Theta Star	20.75		
nu star	82.04		
Approximate Chi Square Value (.05)	62.17	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	116.3
Adjusted Chi Square Value	58.54	95% Jackknife UCL	119.1
		95% Standard Bootstrap UCL	115.1
Anderson-Darling Test Statistic	0.203	95% Bootstrap-t UCL	124.1
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	126
Kolmogorov-Smirnov Test Statistic	0.136	95% Percentile Bootstrap UCL	115.6
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	117.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	152.1
		97.5% Chebyshev(Mean, Sd) UCL	177
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	225.9
95% Approximate Gamma UCL	124.8		
95% Adjusted Gamma UCL	132.6		

Potential UCL to Use		Use 95% Student's-t UCL	119.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_7	101-07-216	1	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5.3	Minimum of Log Data	1.668
Maximum	35.8	Maximum of Log Data	3.578
Mean	14.07	Mean of log Data	2.501
Median	11.7	SD of log Data	0.544
SD	9.036		
Coefficient of Variation	0.642		
Skewness	2.016		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.79	Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	19.67	95% H-UCL	22.31
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	25.04
95% Adjusted-CLT UCL	21.18	97.5% Chebyshev (MVUE) UCL	29.86
95% Modified-t UCL	20.01	99% Chebyshev (MVUE) UCL	39.34

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.509	Data appear Gamma Distributed at 5% Significance Level
Theta Star	5.605	
nu star	45.17	
Approximate Chi Square Value (.05)	30.75	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 19.02
Adjusted Chi Square Value	28.27	95% Jackknife UCL 19.67
		95% Standard Bootstrap UCL 18.91
Anderson-Darling Test Statistic	0.38	95% Bootstrap-t UCL 25.31
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL 40.9
Kolmogorov-Smirnov Test Statistic	0.214	95% Percentile Bootstrap UCL 19.31
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 21.17
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 27.2
		97.5% Chebyshev(Mean, Sd) UCL 32.88
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 44.04
95% Approximate Gamma UCL	20.66	
95% Adjusted Gamma UCL	22.48	

Potential UCL to Use		Use 95% Approximate Gamma UCL	20.66

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_8	101-07-216	1	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	411	Minimum of Log Data	6.019
Maximum	2520	Maximum of Log Data	7.832
Mean	1743	Mean of log Data	7.33
Median	2110	SD of log Data	0.612
SD	781.2		
Coefficient of Variation	0.448		
Skewness	-0.598		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.88	Shapiro Wilk Test Statistic	0.826
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2227	95% H-UCL	3156
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3429
95% Adjusted-CLT UCL	2115	97.5% Chebyshev (MVUE) UCL	4134
95% Modified-t UCL	2218	99% Chebyshev (MVUE) UCL	5521

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.684	Data appear Normal at 5% Significance Level
Theta Star	649.3	
nu star	48.31	
Approximate Chi Square Value (.05)	33.35	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 2171
Adjusted Chi Square Value	30.75	95% Jackknife UCL 2227
		95% Standard Bootstrap UCL 2144
Anderson-Darling Test Statistic	0.607	95% Bootstrap-t UCL 2176
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL 2081
Kolmogorov-Smirnov Test Statistic	0.267	95% Percentile Bootstrap UCL 2141
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 2132
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 2878
		97.5% Chebyshev(Mean, Sd) UCL 3369
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 4333
95% Approximate Gamma UCL	2524	
95% Adjusted Gamma UCL	2737	

Potential UCL to Use	Use 95% Student's-t UCL	2227

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_9	101-07-216	1	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	57.1	Minimum of Log Data	4.045
Maximum	1100	Maximum of Log Data	7.003
Mean	286.1	Mean of log Data	5.204
Median	185	SD of log Data	0.96
SD	332.6		
Coefficient of Variation	1.163		
Skewness	2.223		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.711	Shapiro Wilk Test Statistic	0.947
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	492.2	95% H-UCL	857
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	659.4
95% Adjusted-CLT UCL	556.2	97.5% Chebyshev (MVUE) UCL	827.9
95% Modified-t UCL	505.9	99% Chebyshev (MVUE) UCL	1159

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.905	Data appear Gamma Distributed at 5% Significance Level
Theta Star	316.1	
nu star	16.29	
Approximate Chi Square Value (.05)	8.166	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 468.4
Adjusted Chi Square Value	6.988	95% Jackknife UCL 492.2
		95% Standard Bootstrap UCL 456
Anderson-Darling Test Statistic	0.458	95% Bootstrap-t UCL 911.5
Anderson-Darling 5% Critical Value	0.739	95% Hall's Bootstrap UCL 1242
Kolmogorov-Smirnov Test Statistic	0.198	95% Percentile Bootstrap UCL 486.5
Kolmogorov-Smirnov 5% Critical Value	0.285	95% BCA Bootstrap UCL 577.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 769.3
		97.5% Chebyshev(Mean, Sd) UCL 978.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 1389
95% Approximate Gamma UCL	570.6	
95% Adjusted Gamma UCL	666.8	

Potential UCL to Use		Use 95% Approximate Gamma UCL	570.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_10	101-07-176	2	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	8.4	Minimum of Log Data	2.128
Maximum	213	Maximum of Log Data	5.361
Mean	34.89	Mean of log Data	2.812
Median	11.3	SD of log Data	0.998
SD	66.9		
Coefficient of Variation	1.917		
Skewness	2.982		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.441	Shapiro Wilk Test Statistic	0.655
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	76.36	95% H-UCL	87.55
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	63.66
95% Adjusted-CLT UCL	95.25	97.5% Chebyshev (MVUE) UCL	80.19
95% Modified-t UCL	80.05	99% Chebyshev (MVUE) UCL	112.7
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.609	Data do not follow a Discernable Distribution (0.05)	
Theta Star	57.32		
nu star	10.96		
Approximate Chi Square Value (.05)	4.548	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	71.57
Adjusted Chi Square Value	3.717	95% Jackknife UCL	76.36
		95% Standard Bootstrap UCL	69.23
Anderson-Darling Test Statistic	1.923	95% Bootstrap-t UCL	586.3
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	333
Kolmogorov-Smirnov Test Statistic	0.416	95% Percentile Bootstrap UCL	78.98
Kolmogorov-Smirnov 5% Critical Value	0.289	95% BCA Bootstrap UCL	101.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	132.1
		97.5% Chebyshev(Mean, Sd) UCL	174.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	256.8
95% Approximate Gamma UCL	84.05		
95% Adjusted Gamma UCL	102.8		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	132.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_11	101-07-176	2	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1250	Minimum of Log Data	7.131
Maximum	5600	Maximum of Log Data	8.631
Mean	2521	Mean of log Data	7.709
Median	1790	SD of log Data	0.509
SD	1430		
Coefficient of Variation	0.567		
Skewness	1.4		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.839	Shapiro Wilk Test Statistic	0.917
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	3407	95% H-UCL	3850
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4373
95% Adjusted-CLT UCL	3543	97.5% Chebyshev (MVUE) UCL	5184
95% Modified-t UCL	3445	99% Chebyshev (MVUE) UCL	6777

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.888	Data appear Normal at 5% Significance Level	
Theta Star	873		
nu star	51.98		
Approximate Chi Square Value (.05)	36.42	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	3305
Adjusted Chi Square Value	33.7	95% Jackknife UCL	3407
		95% Standard Bootstrap UCL	3246
Anderson-Darling Test Statistic	0.462	95% Bootstrap-t UCL	3967
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	3728
Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	3306
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	3422
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4599
		97.5% Chebyshev(Mean, Sd) UCL	5498
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7264
95% Approximate Gamma UCL	3598		
95% Adjusted Gamma UCL	3889		

Potential UCL to Use		Use 95% Student's-t UCL	3407

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_12	101-07-176	2	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	45.5	Minimum of Log Data	3.818
Maximum	213	Maximum of Log Data	5.361
Mean	93.94	Mean of log Data	4.427
Median	75.1	SD of log Data	0.488
SD	52.93		
Coefficient of Variation	0.563		
Skewness	1.663		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.831	Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	126.8	95% H-UCL	139.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	159.8
95% Adjusted-CLT UCL	133.4	97.5% Chebyshev (MVUE) UCL	188.7
95% Modified-t UCL	128.4	99% Chebyshev (MVUE) UCL	245.6

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.07	Data appear Normal at 5% Significance Level	
Theta Star	30.6		
nu star	55.26		
Approximate Chi Square Value (.05)	39.18	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	123
Adjusted Chi Square Value	36.34	95% Jackknife UCL	126.8
		95% Standard Bootstrap UCL	121.4
Anderson-Darling Test Statistic	0.359	95% Bootstrap-t UCL	164.5
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	262
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL	122.8
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	130.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	170.8
		97.5% Chebyshev(Mean, Sd) UCL	204.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	269.5
95% Approximate Gamma UCL	132.5		
95% Adjusted Gamma UCL	142.9		

Potential UCL to Use		Use 95% Student's-t UCL	126.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_13	101-07-202	2	Arsenic

General Statistics

Number of Valid Samples	9	Number of Detected Data	8
Number of Unique Samples	7	Number of Non-Detect Data	1
		Percent Non-Detects	11.11%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	3	Minimum Detected	1.099
Maximum Detected	15.3	Maximum Detected	2.728
Mean of Detected	8.4	Mean of Detected	1.968
SD of Detected	4.767	SD of Detected	0.626
Minimum Non-Detect	0.68	Minimum Non-Detect	-0.386
Maximum Non-Detect	0.68	Maximum Non-Detect	-0.386

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Test Statistic	0.909
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.504	Mean	1.63
SD	5.206	SD	1.173
95% DL/2 (t) UCL	10.73	95% H-Stat (DL/2) UCL	47.23
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	7.255	Mean in Log Scale	1.798
SD	5.36	SD in Log Scale	0.777
95% MLE (t) UCL	10.58	Mean in Original Scale	7.639
95% MLE (Tiku) UCL	10.62	SD in Original Scale	5.009
		95% Percentile Bootstrap UCL	10.28
		95% BCA Bootstrap UCL	10.44

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	2.132	Data appear Normal at 5% Significance Level
Theta Star	3.939	
nu star	34.12	
A-D Test Statistic	0.368	
5% A-D Critical Value	0.721	
K-S Test Statistic	0.721	
5% K-S Critical Value	0.296	
Data appear Gamma Distributed at 5% Significance Level		

Assuming Gamma Distribution		Nonparametric Statistics	
Gamma ROS Statistics using Extrapolated Data		Kaplan-Meier (KM) Method	
Minimum	0.442	Mean	7.8
Maximum	15.3	SD	4.534
Mean	7.516	SE of Mean	1.616
Median	7.5	95% KM (t) UCL	10.8
SD	5.188	95% KM (z) UCL	10.46
k star	1.101	95% KM (jackknife) UCL	10.76
Theta star	6.825	95% KM (bootstrap t) UCL	11.12
Nu star	19.82	95% KM (BCA) UCL	10.59
AppChi2	10.72	95% KM (Percentile Bootstrap) UCL	10.44
95% Gamma Approximate UCL	13.9	95% KM (Chebyshev) UCL	14.84
95% Adjusted Gamma UCL	15.95	97.5% KM (Chebyshev) UCL	17.89
Note: DL/2 is not a recommended method.		99% KM (Chebyshev) UCL	23.87
		Potential UCLs to Use	
		95% KM (t) UCL	10.8
		95% KM (Percentile Bootstrap) UCL	10.44

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_14	101-07-202	2	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	186	Minimum of Log Data	5.226
Maximum	3040	Maximum of Log Data	8.02
Mean	1250	Mean of log Data	6.768
Median	1330	SD of log Data	0.973
SD	997.3		
Coefficient of Variation	0.798		
Skewness	0.699		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.9	Shapiro Wilk Test Statistic	0.924
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1868	95% H-UCL	4252
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3210
95% Adjusted-CLT UCL	1880	97.5% Chebyshev (MVUE) UCL	4035
95% Modified-t UCL	1881	99% Chebyshev (MVUE) UCL	5656

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.091	Data appear Normal at 5% Significance Level	
Theta Star	1146		
nu star	19.63		
Approximate Chi Square Value (.05)	10.58	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	1797
Adjusted Chi Square Value	9.212	95% Jackknife UCL	1868
		95% Standard Bootstrap UCL	1771
Anderson-Darling Test Statistic	0.375	95% Bootstrap-t UCL	2049
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	2000
Kolmogorov-Smirnov Test Statistic	0.207	95% Percentile Bootstrap UCL	1794
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL	1816
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2699
		97.5% Chebyshev(Mean, Sd) UCL	3326
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4558
95% Approximate Gamma UCL	2319		
95% Adjusted Gamma UCL	2664		

Potential UCL to Use		Use 95% Student's-t UCL	1868

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_15	101-07-202	2	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13.1	Minimum of Log Data	2.573
Maximum	119	Maximum of Log Data	4.779
Mean	63.59	Mean of log Data	3.868
Median	61.6	SD of log Data	0.871
SD	42.93		
Coefficient of Variation	0.675		
Skewness	0.0616		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.878	Shapiro Wilk Test Statistic	0.876
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	90.2	95% H-UCL	176.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	152.8
95% Adjusted-CLT UCL	87.44	97.5% Chebyshev (MVUE) UCL	190.3
95% Modified-t UCL	90.25	99% Chebyshev (MVUE) UCL	263.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.346	Data appear Normal at 5% Significance Level	
Theta Star	47.26		
nu star	24.22		
Approximate Chi Square Value (.05)	14.02	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	87.13
Adjusted Chi Square Value	12.41	95% Jackknife UCL	90.2
		95% Standard Bootstrap UCL	86.04
Anderson-Darling Test Statistic	0.504	95% Bootstrap-t UCL	90.95
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	82.7
Kolmogorov-Smirnov Test Statistic	0.227	95% Percentile Bootstrap UCL	86.67
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	86.02
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	126
		97.5% Chebyshev(Mean, Sd) UCL	153
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	206
95% Approximate Gamma UCL	109.9		
95% Adjusted Gamma UCL	124.1		
Potential UCL to Use		Use 95% Student's-t UCL	90.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_16	101-07-242	2	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	12	Minimum of Log Data	2.485
Maximum	21.3	Maximum of Log Data	3.059
Mean	14.93	Mean of log Data	2.685
Median	13.4	SD of log Data	0.201
SD	3.225		
Coefficient of Variation	0.216		
Skewness	1.223		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.84	Shapiro Wilk Test Statistic	0.87
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	16.93	95% H-UCL	17.13
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	19.28
95% Adjusted-CLT UCL	17.17	97.5% Chebyshev (MVUE) UCL	21.16
95% Modified-t UCL	17.01	99% Chebyshev (MVUE) UCL	24.87

Gamma Distribution Test		Data Distribution
k star (bias corrected)	17.94	Data appear Normal at 5% Significance Level
Theta Star	0.833	
nu star	322.9	
Approximate Chi Square Value (.05)	282.2	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 16.7
Adjusted Chi Square Value	274.2	95% Jackknife UCL 16.93
		95% Standard Bootstrap UCL 16.62
Anderson-Darling Test Statistic	0.615	95% Bootstrap-t UCL 18.24
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL 17.82
Kolmogorov-Smirnov Test Statistic	0.242	95% Percentile Bootstrap UCL 16.69
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL 16.89
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 19.62
		97.5% Chebyshev(Mean, Sd) UCL 21.65
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 25.63
95% Approximate Gamma UCL	17.08	
95% Adjusted Gamma UCL	17.58	

Potential UCL to Use	Use 95% Student's-t UCL	16.93

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_17	101-07-242	2	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	647	Minimum of Log Data	6.472
Maximum	6530	Maximum of Log Data	8.784
Mean	3276	Mean of log Data	7.869
Median	2940	SD of log Data	0.782
SD	1995		
Coefficient of Variation	0.609		
Skewness	0.204		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Test Statistic	0.923
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4513	95% H-UCL	7741
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7388
95% Adjusted-CLT UCL	4418	97.5% Chebyshev (MVUE) UCL	9110
95% Modified-t UCL	4520	99% Chebyshev (MVUE) UCL	12492

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.658	Data appear Normal at 5% Significance Level	
Theta Star	1977		
nu star	29.84		
Approximate Chi Square Value (.05)	18.36	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4370
Adjusted Chi Square Value	16.49	95% Jackknife UCL	4513
		95% Standard Bootstrap UCL	4306
Anderson-Darling Test Statistic	0.283	95% Bootstrap-t UCL	4555
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	4393
Kolmogorov-Smirnov Test Statistic	0.208	95% Percentile Bootstrap UCL	4277
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	4356
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6175
		97.5% Chebyshev(Mean, Sd) UCL	7429
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9893
95% Approximate Gamma UCL	5323		
95% Adjusted Gamma UCL	5927		

Potential UCL to Use		Use 95% Student's-t UCL	4513

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_18	101-07-242	2	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	50.3	Minimum of Log Data	3.918
Maximum	168	Maximum of Log Data	5.124
Mean	119.8	Mean of log Data	4.734
Median	120	SD of log Data	0.366
SD	36.25		
Coefficient of Variation	0.303		
Skewness	-0.584		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.904	Shapiro Wilk Test Statistic	0.831
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	142.3	95% H-UCL	159.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	185.4
95% Adjusted-CLT UCL	137.1	97.5% Chebyshev (MVUE) UCL	213.4
95% Modified-t UCL	141.9	99% Chebyshev (MVUE) UCL	268.3

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.629	Data appear Normal at 5% Significance Level	
Theta Star	18.07		
nu star	119.3		
Approximate Chi Square Value (.05)	95.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	139.7
Adjusted Chi Square Value	90.54	95% Jackknife UCL	142.3
		95% Standard Bootstrap UCL	138.7
Anderson-Darling Test Statistic	0.644	95% Bootstrap-t UCL	139.1
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	138.9
Kolmogorov-Smirnov Test Statistic	0.312	95% Percentile Bootstrap UCL	138
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	137.4
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	172.5
		97.5% Chebyshev(Mean, Sd) UCL	195.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	240
95% Approximate Gamma UCL	150.3		
95% Adjusted Gamma UCL	157.9		

Potential UCL to Use		Use 95% Student's-t UCL	142.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_19	101-07-244	2	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4.8	Minimum of Log Data	1.569
Maximum	14.4	Maximum of Log Data	2.667
Mean	9.344	Mean of log Data	2.186
Median	8.9	SD of log Data	0.334
SD	3.069		
Coefficient of Variation	0.328		
Skewness	0.6		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.947
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	11.25	95% H-UCL	12.01
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13.92
95% Adjusted-CLT UCL	11.25	97.5% Chebyshev (MVUE) UCL	15.9
95% Modified-t UCL	11.28	99% Chebyshev (MVUE) UCL	19.78

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.06	Data appear Normal at 5% Significance Level	
Theta Star	1.324		
nu star	127.1		
Approximate Chi Square Value (.05)	102	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	11.03
Adjusted Chi Square Value	97.31	95% Jackknife UCL	11.25
		95% Standard Bootstrap UCL	10.89
Anderson-Darling Test Statistic	0.317	95% Bootstrap-t UCL	12.13
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	13.68
Kolmogorov-Smirnov Test Statistic	0.163	95% Percentile Bootstrap UCL	10.87
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	11.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13.8
		97.5% Chebyshev(Mean, Sd) UCL	15.73
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	19.52
95% Approximate Gamma UCL	11.64		
95% Adjusted Gamma UCL	12.2		

Potential UCL to Use		Use 95% Student's-t UCL	11.25

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_20	101-07-244	2	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1230	Minimum of Log Data	7.115
Maximum	4270	Maximum of Log Data	8.359
Mean	2313	Mean of log Data	7.671
Median	2080	SD of log Data	0.408
SD	980.8		
Coefficient of Variation	0.424		
Skewness	1.002		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.97
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2921	95% H-UCL	3188
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3693
95% Adjusted-CLT UCL	2968	97.5% Chebyshev (MVUE) UCL	4292
95% Modified-t UCL	2939	99% Chebyshev (MVUE) UCL	5468

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.607	Data appear Normal at 5% Significance Level	
Theta Star	502.1		
nu star	82.92		
Approximate Chi Square Value (.05)	62.94	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2851
Adjusted Chi Square Value	59.28	95% Jackknife UCL	2921
		95% Standard Bootstrap UCL	2824
Anderson-Darling Test Statistic	0.209	95% Bootstrap-t UCL	3107
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	3347
Kolmogorov-Smirnov Test Statistic	0.144	95% Percentile Bootstrap UCL	2850
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	2931
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3738
		97.5% Chebyshev(Mean, Sd) UCL	4355
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	5566
95% Approximate Gamma UCL	3048		
95% Adjusted Gamma UCL	3236		

Potential UCL to Use		Use 95% Student's-t UCL	2921

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_21	101-07-244	2	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	51.2	Minimum of Log Data	3.936
Maximum	196	Maximum of Log Data	5.278
Mean	122.2	Mean of log Data	4.714
Median	112	SD of log Data	0.472
SD	52.01		
Coefficient of Variation	0.426		
Skewness	0.204		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.919	Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	154.4	95% H-UCL	181.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	208.5
95% Adjusted-CLT UCL	151.9	97.5% Chebyshev (MVUE) UCL	245.4
95% Modified-t UCL	154.6	99% Chebyshev (MVUE) UCL	318.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.825	Data appear Normal at 5% Significance Level	
Theta Star	31.94		
nu star	68.84		
Approximate Chi Square Value (.05)	50.74	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	150.7
Adjusted Chi Square Value	47.48	95% Jackknife UCL	154.4
		95% Standard Bootstrap UCL	149.8
Anderson-Darling Test Statistic	0.365	95% Bootstrap-t UCL	157.8
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	157.2
Kolmogorov-Smirnov Test Statistic	0.196	95% Percentile Bootstrap UCL	149.6
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	151.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	197.7
		97.5% Chebyshev(Mean, Sd) UCL	230.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	294.7
95% Approximate Gamma UCL	165.7		
95% Adjusted Gamma UCL	177.1		

Potential UCL to Use	Use 95% Student's-t UCL	154.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_22	101-07-247	2	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	2.7	Minimum of Log Data	0.993
Maximum	12.5	Maximum of Log Data	2.526
Mean	8.189	Mean of log Data	2.017
Median	8.2	SD of log Data	0.475
SD	3.169		
Coefficient of Variation	0.387		
Skewness	-0.253		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.956	Shapiro Wilk Test Statistic	0.888
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10.15	95% H-UCL	12.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	14.1
95% Adjusted-CLT UCL	9.831	97.5% Chebyshev (MVUE) UCL	16.62
95% Modified-t UCL	10.14	99% Chebyshev (MVUE) UCL	21.55

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.068	Data appear Normal at 5% Significance Level	
Theta Star	2.013		
nu star	73.22		
Approximate Chi Square Value (.05)	54.52	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	9.926
Adjusted Chi Square Value	51.13	95% Jackknife UCL	10.15
		95% Standard Bootstrap UCL	9.841
Anderson-Darling Test Statistic	0.348	95% Bootstrap-t UCL	10.16
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	10.01
Kolmogorov-Smirnov Test Statistic	0.211	95% Percentile Bootstrap UCL	9.811
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	9.756
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	12.79
		97.5% Chebyshev(Mean, Sd) UCL	14.79
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	18.7
95% Approximate Gamma UCL	11		
95% Adjusted Gamma UCL	11.73		

Potential UCL to Use		Use 95% Student's-t UCL	10.15

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_23	101-07-247	2	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	798	Minimum of Log Data	6.682
Maximum	3200	Maximum of Log Data	8.071
Mean	2022	Mean of log Data	7.516
Median	2200	SD of log Data	0.49
SD	849		
Coefficient of Variation	0.42		
Skewness	-0.169		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.93	Shapiro Wilk Test Statistic	0.895
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2548	95% H-UCL	3077
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3514
95% Adjusted-CLT UCL	2470	97.5% Chebyshev (MVUE) UCL	4151
95% Modified-t UCL	2546	99% Chebyshev (MVUE) UCL	5403

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.664	Data appear Normal at 5% Significance Level	
Theta Star	551.9		
nu star	65.95		
Approximate Chi Square Value (.05)	48.26	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2487
Adjusted Chi Square Value	45.09	95% Jackknife UCL	2548
		95% Standard Bootstrap UCL	2469
Anderson-Darling Test Statistic	0.454	95% Bootstrap-t UCL	2535
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	2444
Kolmogorov-Smirnov Test Statistic	0.223	95% Percentile Bootstrap UCL	2462
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	2432
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3256
		97.5% Chebyshev(Mean, Sd) UCL	3789
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4838
95% Approximate Gamma UCL	2763		
95% Adjusted Gamma UCL	2958		

Potential UCL to Use		Use 95% Student's-t UCL	2548

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_24	101-07-247	2	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	41.6	Minimum of Log Data	3.728
Maximum	840	Maximum of Log Data	6.733
Mean	232.4	Mean of log Data	5.087
Median	179	SD of log Data	0.88
SD	241.8		
Coefficient of Variation	1.041		
Skewness	2.376		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.708	Shapiro Wilk Test Statistic	0.975
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	382.3	95% H-UCL	612.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	524.1
95% Adjusted-CLT UCL	433.2	97.5% Chebyshev (MVUE) UCL	653.2
95% Modified-t UCL	392.9	99% Chebyshev (MVUE) UCL	906.6

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.094	Data appear Gamma Distributed at 5% Significance Level
Theta Star	212.5	
nu star	19.69	
Approximate Chi Square Value (.05)	10.62	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 365
Adjusted Chi Square Value	9.251	95% Jackknife UCL 382.3
		95% Standard Bootstrap UCL 358.8
Anderson-Darling Test Statistic	0.356	95% Bootstrap-t UCL 573.1
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL 898.3
Kolmogorov-Smirnov Test Statistic	0.219	95% Percentile Bootstrap UCL 369.8
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL 419.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 583.8
		97.5% Chebyshev(Mean, Sd) UCL 735.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 1034
95% Approximate Gamma UCL	430.8	
95% Adjusted Gamma UCL	494.7	

Potential UCL to Use		Use 95% Approximate Gamma UCL	430.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_25	101-07-219	3	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	6.9	Minimum of Log Data	1.932
Maximum	25.8	Maximum of Log Data	3.25
Mean	16.34	Mean of log Data	2.719
Median	17.3	SD of log Data	0.438
SD	5.936		
Coefficient of Variation	0.363		
Skewness	-0.39		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.932	Shapiro Wilk Test Statistic	0.856
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20.02	95% H-UCL	23.49
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	27.12
95% Adjusted-CLT UCL	19.32	97.5% Chebyshev (MVUE) UCL	31.72
95% Modified-t UCL	19.98	99% Chebyshev (MVUE) UCL	40.74

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.655	Data appear Normal at 5% Significance Level	
Theta Star	3.511		
nu star	83.8		
Approximate Chi Square Value (.05)	63.7	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	19.6
Adjusted Chi Square Value	60.02	95% Jackknife UCL	20.02
		95% Standard Bootstrap UCL	19.37
Anderson-Darling Test Statistic	0.586	95% Bootstrap-t UCL	19.48
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	19.33
Kolmogorov-Smirnov Test Statistic	0.234	95% Percentile Bootstrap UCL	19.49
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	19.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24.97
		97.5% Chebyshev(Mean, Sd) UCL	28.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	36.03
95% Approximate Gamma UCL	21.5		
95% Adjusted Gamma UCL	22.82		

Potential UCL to Use		Use 95% Student's-t UCL	20.02

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_26	101-07-219	3	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1770	Minimum of Log Data	7.479
Maximum	4910	Maximum of Log Data	8.499
Mean	3349	Mean of log Data	8.068
Median	3320	SD of log Data	0.337
SD	1055		
Coefficient of Variation	0.315		
Skewness	0.0596		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.963	Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4003	95% H-UCL	4326
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5013
95% Adjusted-CLT UCL	3935	97.5% Chebyshev (MVUE) UCL	5730
95% Modified-t UCL	4004	99% Chebyshev (MVUE) UCL	7139
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.125	Data appear Normal at 5% Significance Level	
Theta Star	470		
nu star	128.3		
Approximate Chi Square Value (.05)	103.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	3927
Adjusted Chi Square Value	98.34	95% Jackknife UCL	4003
		95% Standard Bootstrap UCL	3890
Anderson-Darling Test Statistic	0.224	95% Bootstrap-t UCL	3996
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	3998
Kolmogorov-Smirnov Test Statistic	0.169	95% Percentile Bootstrap UCL	3902
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	3890
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4881
		97.5% Chebyshev(Mean, Sd) UCL	5544
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6847
95% Approximate Gamma UCL	4166		
95% Adjusted Gamma UCL	4367		
Potential UCL to Use		Use 95% Student's-t UCL	4003

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_27	101-07-219	3	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	60	Minimum of Log Data	4.094
Maximum	212	Maximum of Log Data	5.357
Mean	125.1	Mean of log Data	4.775
Median	133	SD of log Data	0.359
SD	42.71		
Coefficient of Variation	0.341		
Skewness	0.619		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.924	Shapiro Wilk Test Statistic	0.933
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	151.6	95% H-UCL	165
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	191.4
95% Adjusted-CLT UCL	151.7	97.5% Chebyshev (MVUE) UCL	219.9
95% Modified-t UCL	152.1	99% Chebyshev (MVUE) UCL	276

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.312	Data appear Normal at 5% Significance Level	
Theta Star	19.83		
nu star	113.6		
Approximate Chi Square Value (.05)	90.02	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	148.6
Adjusted Chi Square Value	85.59	95% Jackknife UCL	151.6
		95% Standard Bootstrap UCL	147.1
Anderson-Darling Test Statistic	0.39	95% Bootstrap-t UCL	153.3
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	162.6
Kolmogorov-Smirnov Test Statistic	0.212	95% Percentile Bootstrap UCL	147.7
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	150.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	187.2
		97.5% Chebyshev(Mean, Sd) UCL	214.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	266.8
95% Approximate Gamma UCL	158		
95% Adjusted Gamma UCL	166.1		

Potential UCL to Use		Use 95% Student's-t UCL	151.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_28	101-07-234	3	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	5.5	Minimum of Log Data	1.705
Maximum	13.3	Maximum of Log Data	2.588
Mean	8.678	Mean of log Data	2.126
Median	8	SD of log Data	0.277
SD	2.469		
Coefficient of Variation	0.285		
Skewness	0.763		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.933	Shapiro Wilk Test Statistic	0.963
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	10.21	95% H-UCL	10.59
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	12.17
95% Adjusted-CLT UCL	10.26	97.5% Chebyshev (MVUE) UCL	13.69
95% Modified-t UCL	10.24	99% Chebyshev (MVUE) UCL	16.67

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	9.842	Data appear Normal at 5% Significance Level	
Theta Star	0.882		
nu star	177.1		
Approximate Chi Square Value (.05)	147.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	10.03
Adjusted Chi Square Value	141.6	95% Jackknife UCL	10.21
		95% Standard Bootstrap UCL	9.96
Anderson-Darling Test Statistic	0.293	95% Bootstrap-t UCL	10.77
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	10.43
Kolmogorov-Smirnov Test Statistic	0.188	95% Percentile Bootstrap UCL	10.02
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	10.06
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	12.27
		97.5% Chebyshev(Mean, Sd) UCL	13.82
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	16.87
95% Approximate Gamma UCL	10.43		
95% Adjusted Gamma UCL	10.85		

Potential UCL to Use		Use 95% Student's-t UCL	10.21

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_29	101-07-234	3	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	1510	Minimum of Log Data	7.32
Maximum	4150	Maximum of Log Data	8.331
Mean	2261	Mean of log Data	7.679
Median	2000	SD of log Data	0.301
SD	797.1		
Coefficient of Variation	0.353		
Skewness	1.939		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.787	Shapiro Wilk Test Statistic	0.884
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	2755	95% H-UCL	2807
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3241
95% Adjusted-CLT UCL	2882	97.5% Chebyshev (MVUE) UCL	3669
95% Modified-t UCL	2784	99% Chebyshev (MVUE) UCL	4510

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.677	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	294.5		
nu star	138.2		
Approximate Chi Square Value (.05)	112	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2698
Adjusted Chi Square Value	107.1	95% Jackknife UCL	2755
		95% Standard Bootstrap UCL	2667
Anderson-Darling Test Statistic	0.617	95% Bootstrap-t UCL	3193
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	4404
Kolmogorov-Smirnov Test Statistic	0.25	95% Percentile Bootstrap UCL	2716
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	2871
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3419
		97.5% Chebyshev(Mean, Sd) UCL	3920
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4905
95% Approximate Gamma UCL	2789		
95% Adjusted Gamma UCL	2918		

Potential UCL to Use		Use 95% Approximate Gamma UCL	2789

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_30	101-07-234	3	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	26.3	Minimum of Log Data	3.27
Maximum	352	Maximum of Log Data	5.864
Mean	97.58	Mean of log Data	4.291
Median	66.5	SD of log Data	0.738
SD	99.03		
Coefficient of Variation	1.015		
Skewness	2.6		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.649	Shapiro Wilk Test Statistic	0.935
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	159	95% H-UCL	195.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	194.5
95% Adjusted-CLT UCL	182.4	97.5% Chebyshev (MVUE) UCL	238.5
95% Modified-t UCL	163.7	99% Chebyshev (MVUE) UCL	325.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.326	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	73.57		
nu star	23.87		
Approximate Chi Square Value (.05)	13.75	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	151.9
Adjusted Chi Square Value	12.16	95% Jackknife UCL	159
		95% Standard Bootstrap UCL	148.8
Anderson-Darling Test Statistic	0.606	95% Bootstrap-t UCL	283.5
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	391.2
Kolmogorov-Smirnov Test Statistic	0.229	95% Percentile Bootstrap UCL	156.5
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	194.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	241.5
		97.5% Chebyshev(Mean, Sd) UCL	303.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	426
95% Approximate Gamma UCL	169.4		
95% Adjusted Gamma UCL	191.5		

Potential UCL to Use		Use 95% Approximate Gamma UCL	169.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_31	101-07-236	3	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	7.9	Minimum of Log Data	2.067
Maximum	50.6	Maximum of Log Data	3.924
Mean	19.54	Mean of log Data	2.836
Median	18.2	SD of log Data	0.529
SD	12.48		
Coefficient of Variation	0.638		
Skewness	2.247		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.729	Shapiro Wilk Test Statistic	0.911
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	27.28	95% H-UCL	30.42
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	34.33
95% Adjusted-CLT UCL	29.71	97.5% Chebyshev (MVUE) UCL	40.84
95% Modified-t UCL	27.8	99% Chebyshev (MVUE) UCL	53.63

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.627	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	7.441		
nu star	47.28		
Approximate Chi Square Value (.05)	32.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	26.39
Adjusted Chi Square Value	29.94	95% Jackknife UCL	27.28
		95% Standard Bootstrap UCL	25.93
Anderson-Darling Test Statistic	0.59	95% Bootstrap-t UCL	33.39
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	57.13
Kolmogorov-Smirnov Test Statistic	0.266	95% Percentile Bootstrap UCL	26.82
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	28.73
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	37.67
		97.5% Chebyshev(Mean, Sd) UCL	45.52
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	60.93
95% Approximate Gamma UCL	28.43		
95% Adjusted Gamma UCL	30.87		

Potential UCL to Use		Use 95% Approximate Gamma UCL	28.43

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_32	101-07-236	3	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1090	Minimum of Log Data	6.994
Maximum	7900	Maximum of Log Data	8.975
Mean	4064	Mean of log Data	8.175
Median	4050	SD of log Data	0.601
SD	1972		
Coefficient of Variation	0.485		
Skewness	0.377		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.928	Shapiro Wilk Test Statistic	0.873
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5287	95% H-UCL	7192
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7862
95% Adjusted-CLT UCL	5234	97.5% Chebyshev (MVUE) UCL	9464
95% Modified-t UCL	5301	99% Chebyshev (MVUE) UCL	12610

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.658	Data appear Normal at 5% Significance Level	
Theta Star	1529		
nu star	47.84		
Approximate Chi Square Value (.05)	32.96	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5146
Adjusted Chi Square Value	30.38	95% Jackknife UCL	5287
		95% Standard Bootstrap UCL	5095
Anderson-Darling Test Statistic	0.536	95% Bootstrap-t UCL	5321
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	5561
Kolmogorov-Smirnov Test Statistic	0.263	95% Percentile Bootstrap UCL	5120
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	5138
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6930
		97.5% Chebyshev(Mean, Sd) UCL	8170
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10606
95% Approximate Gamma UCL	5899		
95% Adjusted Gamma UCL	6400		

Potential UCL to Use		Use 95% Student's-t UCL	5287

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_33	101-07-236	3	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	60.8	Minimum of Log Data	4.108
Maximum	381	Maximum of Log Data	5.943
Mean	182.3	Mean of log Data	5.106
Median	169	SD of log Data	0.489
SD	86.86		
Coefficient of Variation	0.476		
Skewness	1.417		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.855	Shapiro Wilk Test Statistic	0.91
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	236.1	95% H-UCL	275.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	315.2
95% Adjusted-CLT UCL	244.5	97.5% Chebyshev (MVUE) UCL	372.3
95% Modified-t UCL	238.4	99% Chebyshev (MVUE) UCL	484.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.526	Data appear Normal at 5% Significance Level	
Theta Star	51.7		
nu star	63.47		
Approximate Chi Square Value (.05)	46.15	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	229.9
Adjusted Chi Square Value	43.05	95% Jackknife UCL	236.1
		95% Standard Bootstrap UCL	227.4
Anderson-Darling Test Statistic	0.482	95% Bootstrap-t UCL	253.6
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	507.3
Kolmogorov-Smirnov Test Statistic	0.214	95% Percentile Bootstrap UCL	229.9
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	247
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	308.5
		97.5% Chebyshev(Mean, Sd) UCL	363.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	470.4
95% Approximate Gamma UCL	250.8		
95% Adjusted Gamma UCL	268.8		

Potential UCL to Use		Use 95% Student's-t UCL	236.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_34	101-07-142A	4	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	0.51	Minimum of Log Data	-0.673
Maximum	31.5	Maximum of Log Data	3.45
Mean	10.77	Mean of log Data	1.839
Median	10.2	SD of log Data	1.347
SD	9.401		
Coefficient of Variation	0.873		
Skewness	1.323		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Test Statistic	0.874
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	16.59	95% H-UCL	112.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	40.4
95% Adjusted-CLT UCL	17.4	97.5% Chebyshev (MVUE) UCL	52.12
95% Modified-t UCL	16.82	99% Chebyshev (MVUE) UCL	75.12

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.785	Data appear Normal at 5% Significance Level	
Theta Star	13.72		
nu star	14.13		
Approximate Chi Square Value (.05)	6.658	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	15.92
Adjusted Chi Square Value	5.613	95% Jackknife UCL	16.59
		95% Standard Bootstrap UCL	15.54
Anderson-Darling Test Statistic	0.36	95% Bootstrap-t UCL	18.91
Anderson-Darling 5% Critical Value	0.742	95% Hall's Bootstrap UCL	41.41
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL	16.11
Kolmogorov-Smirnov 5% Critical Value	0.287	95% BCA Bootstrap UCL	16.96
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24.42
		97.5% Chebyshev(Mean, Sd) UCL	30.33
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	41.94
95% Approximate Gamma UCL	22.84		
95% Adjusted Gamma UCL	27.09		

Potential UCL to Use	Use 95% Student's-t UCL	16.59

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_35	101-07-142A	4	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	268	Minimum of Log Data	5.591
Maximum	4690	Maximum of Log Data	8.453
Mean	1618	Mean of log Data	6.973
Median	1550	SD of log Data	1.029
SD	1451		
Coefficient of Variation	0.896		
Skewness	1.241		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.871	Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2518	95% H-UCL	6168
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4270
95% Adjusted-CLT UCL	2628	97.5% Chebyshev (MVUE) UCL	5393
95% Modified-t UCL	2551	99% Chebyshev (MVUE) UCL	7599

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.971	Data appear Normal at 5% Significance Level	
Theta Star	1667		
nu star	17.48		
Approximate Chi Square Value (.05)	9.013	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2414
Adjusted Chi Square Value	7.765	95% Jackknife UCL	2518
		95% Standard Bootstrap UCL	2364
Anderson-Darling Test Statistic	0.309	95% Bootstrap-t UCL	2889
Anderson-Darling 5% Critical Value	0.737	95% Hall's Bootstrap UCL	3526
Kolmogorov-Smirnov Test Statistic	0.172	95% Percentile Bootstrap UCL	2385
Kolmogorov-Smirnov 5% Critical Value	0.285	95% BCA Bootstrap UCL	2540
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3726
		97.5% Chebyshev(Mean, Sd) UCL	4638
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6430
95% Approximate Gamma UCL	3138		
95% Adjusted Gamma UCL	3642		

Potential UCL to Use		Use 95% Student's-t UCL	2518

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_36	101-07-142A	4	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	17.1	Minimum of Log Data	2.839
Maximum	185	Maximum of Log Data	5.22
Mean	84.49	Mean of log Data	4.117
Median	61.1	SD of log Data	0.904
SD	63.03		
Coefficient of Variation	0.746		
Skewness	0.41		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.901
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	123.6	95% H-UCL	247.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	205.5
95% Adjusted-CLT UCL	122.1	97.5% Chebyshev (MVUE) UCL	256.7
95% Modified-t UCL	124	99% Chebyshev (MVUE) UCL	357.3
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.216	Data appear Normal at 5% Significance Level	
Theta Star	69.47		
nu star	21.89		
Approximate Chi Square Value (.05)	12.26	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	119
Adjusted Chi Square Value	10.77	95% Jackknife UCL	123.6
		95% Standard Bootstrap UCL	117.6
Anderson-Darling Test Statistic	0.435	95% Bootstrap-t UCL	127.8
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL	114.6
Kolmogorov-Smirnov Test Statistic	0.203	95% Percentile Bootstrap UCL	115.9
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	118.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	176.1
		97.5% Chebyshev(Mean, Sd) UCL	215.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	293.5
95% Approximate Gamma UCL	150.9		
95% Adjusted Gamma UCL	171.8		
Potential UCL to Use		Use 95% Student's-t UCL	123.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_37	101-07-149	4	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	5.4	Minimum of Log Data	1.686
Maximum	33.6	Maximum of Log Data	3.515
Mean	16	Mean of log Data	2.669
Median	16.4	SD of log Data	0.495
SD	7.793		
Coefficient of Variation	0.487		
Skewness	1.373		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.871	Shapiro Wilk Test Statistic	0.932
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	20.83	95% H-UCL	24.35
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	27.78
95% Adjusted-CLT UCL	21.54	97.5% Chebyshev (MVUE) UCL	32.85
95% Modified-t UCL	21.03	99% Chebyshev (MVUE) UCL	42.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.409	Data appear Normal at 5% Significance Level	
Theta Star	4.694		
nu star	61.36		
Approximate Chi Square Value (.05)	44.34	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	20.27
Adjusted Chi Square Value	41.31	95% Jackknife UCL	20.83
		95% Standard Bootstrap UCL	20.04
Anderson-Darling Test Statistic	0.383	95% Bootstrap-t UCL	22.53
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	44.26
Kolmogorov-Smirnov Test Statistic	0.218	95% Percentile Bootstrap UCL	20.27
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	21.07
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.32
		97.5% Chebyshev(Mean, Sd) UCL	32.22
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	41.85
95% Approximate Gamma UCL	22.14		
95% Adjusted Gamma UCL	23.77		
Potential UCL to Use		Use 95% Student's-t UCL	20.83

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_38	101-07-149	4	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1770	Minimum of Log Data	7.479
Maximum	10300	Maximum of Log Data	9.24
Mean	3869	Mean of log Data	8.12
Median	3180	SD of log Data	0.526
SD	2574		
Coefficient of Variation	0.665		
Skewness	2.316		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.725	Shapiro Wilk Test Statistic	0.916
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5465	95% H-UCL	5967
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6740
95% Adjusted-CLT UCL	5988	97.5% Chebyshev (MVUE) UCL	8014
95% Modified-t UCL	5575	99% Chebyshev (MVUE) UCL	10517

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.553	Data appear Gamma Distributed at 5% Significance Level
Theta Star	1516	
nu star	45.95	
Approximate Chi Square Value (.05)	31.4	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 5280
Adjusted Chi Square Value	28.88	95% Jackknife UCL 5465
		95% Standard Bootstrap UCL 5201
Anderson-Darling Test Statistic	0.523	95% Bootstrap-t UCL 7419
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL 11433
Kolmogorov-Smirnov Test Statistic	0.214	95% Percentile Bootstrap UCL 5279
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 5812
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 7609
		97.5% Chebyshev(Mean, Sd) UCL 9228
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 12407
95% Approximate Gamma UCL	5662	
95% Adjusted Gamma UCL	6155	

Potential UCL to Use		Use 95% Approximate Gamma UCL	5662

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_39	101-07-149	4	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	55.6	Minimum of Log Data	4.018
Maximum	424	Maximum of Log Data	6.05
Mean	174.7	Mean of log Data	4.949
Median	119	SD of log Data	0.69
SD	123.9		
Coefficient of Variation	0.709		
Skewness	1.133		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.87	Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	251.5	95% H-UCL	340.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	351.7
95% Adjusted-CLT UCL	259.3	97.5% Chebyshev (MVUE) UCL	428.7
95% Modified-t UCL	254.1	99% Chebyshev (MVUE) UCL	580.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.736	Data appear Normal at 5% Significance Level	
Theta Star	100.7		
nu star	31.24		
Approximate Chi Square Value (.05)	19.47	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	242.7
Adjusted Chi Square Value	17.54	95% Jackknife UCL	251.5
		95% Standard Bootstrap UCL	237.7
Anderson-Darling Test Statistic	0.343	95% Bootstrap-t UCL	288.8
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	255.5
Kolmogorov-Smirnov Test Statistic	0.193	95% Percentile Bootstrap UCL	239.6
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	253.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	354.7
		97.5% Chebyshev(Mean, Sd) UCL	432.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	585.6
95% Approximate Gamma UCL	280.4		
95% Adjusted Gamma UCL	311.3		

Potential UCL to Use		Use 95% Student's-t UCL	251.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_40	101-07-251	4	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5.5	Minimum of Log Data	1.705
Maximum	24.2	Maximum of Log Data	3.186
Mean	12.77	Mean of log Data	2.458
Median	12	SD of log Data	0.456
SD	5.659		
Coefficient of Variation	0.443		
Skewness	0.818		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.945	Shapiro Wilk Test Statistic	0.977
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	16.27	95% H-UCL	18.58
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21.39
95% Adjusted-CLT UCL	16.42	97.5% Chebyshev (MVUE) UCL	25.1
95% Modified-t UCL	16.36	99% Chebyshev (MVUE) UCL	32.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.916	Data appear Normal at 5% Significance Level	
Theta Star	3.26		
nu star	70.49		
Approximate Chi Square Value (.05)	52.16	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	15.87
Adjusted Chi Square Value	48.85	95% Jackknife UCL	16.27
		95% Standard Bootstrap UCL	15.69
Anderson-Darling Test Statistic	0.182	95% Bootstrap-t UCL	16.9
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	17.61
Kolmogorov-Smirnov Test Statistic	0.142	95% Percentile Bootstrap UCL	16.06
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	16.34
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	20.99
		97.5% Chebyshev(Mean, Sd) UCL	24.55
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	31.54
95% Approximate Gamma UCL	17.25		
95% Adjusted Gamma UCL	18.42		

Potential UCL to Use		Use 95% Student's-t UCL	16.27

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_41	101-07-251	4	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	1280	Minimum of Log Data	7.155
Maximum	4480	Maximum of Log Data	8.407
Mean	3056	Mean of log Data	7.944
Median	3320	SD of log Data	0.456
SD	1142		
Coefficient of Variation	0.374		
Skewness	-0.525		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.909	Shapiro Wilk Test Statistic	0.842
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	3763	95% H-UCL	4482
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5159
95% Adjusted-CLT UCL	3611	97.5% Chebyshev (MVUE) UCL	6055
95% Modified-t UCL	3752	99% Chebyshev (MVUE) UCL	7814
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.327	Data appear Normal at 5% Significance Level	
Theta Star	706.2		
nu star	77.89		
Approximate Chi Square Value (.05)	58.56	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	3682
Adjusted Chi Square Value	55.03	95% Jackknife UCL	3763
		95% Standard Bootstrap UCL	3655
Anderson-Darling Test Statistic	0.599	95% Bootstrap-t UCL	3659
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	3593
Kolmogorov-Smirnov Test Statistic	0.271	95% Percentile Bootstrap UCL	3654
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	3563
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4715
		97.5% Chebyshev(Mean, Sd) UCL	5433
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6843
95% Approximate Gamma UCL	4064		
95% Adjusted Gamma UCL	4324		
Potential UCL to Use		Use 95% Student's-t UCL	3763

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_42	101-07-251	4	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	68.5	Minimum of Log Data	4.227
Maximum	238	Maximum of Log Data	5.472
Mean	143.5	Mean of log Data	4.901
Median	125	SD of log Data	0.381
SD	56.5		
Coefficient of Variation	0.394		
Skewness	1.002		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.821	Shapiro Wilk Test Statistic	0.883
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	178.5	95% H-UCL	192.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	223.4
95% Adjusted-CLT UCL	181.2	97.5% Chebyshev (MVUE) UCL	258
95% Modified-t UCL	179.6	99% Chebyshev (MVUE) UCL	326.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.307	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	27.04		
nu star	95.52		
Approximate Chi Square Value (.05)	73.98	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	174.5
Adjusted Chi Square Value	69.99	95% Jackknife UCL	178.5
		95% Standard Bootstrap UCL	172
Anderson-Darling Test Statistic	0.699	95% Bootstrap-t UCL	216.2
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	470.9
Kolmogorov-Smirnov Test Statistic	0.252	95% Percentile Bootstrap UCL	173.7
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	177.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	225.6
		97.5% Chebyshev(Mean, Sd) UCL	261.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	330.9
95% Approximate Gamma UCL	185.3		
95% Adjusted Gamma UCL	195.8		

Potential UCL to Use		Use 95% Approximate Gamma UCL	185.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_43	101-07-259	4	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3.2	Minimum of Log Data	1.163
Maximum	17.2	Maximum of Log Data	2.845
Mean	9.956	Mean of log Data	2.122
Median	9.9	SD of log Data	0.666
SD	5.591		
Coefficient of Variation	0.562		
Skewness	0.00433		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk Test Statistic	0.878
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	13.42	95% H-UCL	19.18
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	20.15
95% Adjusted-CLT UCL	13.02	97.5% Chebyshev (MVUE) UCL	24.49
95% Modified-t UCL	13.42	99% Chebyshev (MVUE) UCL	33.01

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.067	Data appear Normal at 5% Significance Level	
Theta Star	4.816		
nu star	37.21		
Approximate Chi Square Value (.05)	24.24	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	13.02
Adjusted Chi Square Value	22.06	95% Jackknife UCL	13.42
		95% Standard Bootstrap UCL	12.84
Anderson-Darling Test Statistic	0.502	95% Bootstrap-t UCL	13.41
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	12.37
Kolmogorov-Smirnov Test Statistic	0.22	95% Percentile Bootstrap UCL	12.9
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	12.83
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	18.08
		97.5% Chebyshev(Mean, Sd) UCL	21.59
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	28.5
95% Approximate Gamma UCL	15.28		
95% Adjusted Gamma UCL	16.79		

Potential UCL to Use		Use 95% Student's-t UCL	13.42

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_44	101-07-259	4	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	538	Minimum of Log Data	6.288
Maximum	4980	Maximum of Log Data	8.513
Mean	2424	Mean of log Data	7.564
Median	2490	SD of log Data	0.785
SD	1499		
Coefficient of Variation	0.618		
Skewness	0.296		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Test Statistic	0.908
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	3353	95% H-UCL	5751
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5469
95% Adjusted-CLT UCL	3298	97.5% Chebyshev (MVUE) UCL	6746
95% Modified-t UCL	3361	99% Chebyshev (MVUE) UCL	9255

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.629	Data appear Normal at 5% Significance Level	
Theta Star	1487		
nu star	29.33		
Approximate Chi Square Value (.05)	17.97	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	3246
Adjusted Chi Square Value	16.12	95% Jackknife UCL	3353
		95% Standard Bootstrap UCL	3190
Anderson-Darling Test Statistic	0.332	95% Bootstrap-t UCL	3414
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	3342
Kolmogorov-Smirnov Test Statistic	0.2	95% Percentile Bootstrap UCL	3222
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	3212
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4602
		97.5% Chebyshev(Mean, Sd) UCL	5544
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7395
95% Approximate Gamma UCL	3957		
95% Adjusted Gamma UCL	4410		

Potential UCL to Use		Use 95% Student's-t UCL	3353

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_45	101-07-259	4	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	31.2	Minimum of Log Data	3.44
Maximum	167	Maximum of Log Data	5.118
Mean	76.96	Mean of log Data	4.191
Median	80.6	SD of log Data	0.589
SD	44.95		
Coefficient of Variation	0.584		
Skewness	0.932		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.887	Shapiro Wilk Test Statistic	0.915
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	104.8	95% H-UCL	130.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	144
95% Adjusted-CLT UCL	106.6	97.5% Chebyshev (MVUE) UCL	173
95% Modified-t UCL	105.6	99% Chebyshev (MVUE) UCL	230

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.372	Data appear Normal at 5% Significance Level	
Theta Star	32.44		
nu star	42.7		
Approximate Chi Square Value (.05)	28.72	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	101.6
Adjusted Chi Square Value	26.32	95% Jackknife UCL	104.8
		95% Standard Bootstrap UCL	100.1
Anderson-Darling Test Statistic	0.438	95% Bootstrap-t UCL	111.5
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	110.5
Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	100.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	103.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	142.3
		97.5% Chebyshev(Mean, Sd) UCL	170.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	226
95% Approximate Gamma UCL	114.4		
95% Adjusted Gamma UCL	124.8		

Potential UCL to Use		Use 95% Student's-t UCL	104.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_46	101-07-129	5	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5.1	Minimum of Log Data	1.629
Maximum	33.7	Maximum of Log Data	3.517
Mean	20.17	Mean of log Data	2.885
Median	19.1	SD of log Data	0.578
SD	8.762		
Coefficient of Variation	0.434		
Skewness	-0.288		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.975	Shapiro Wilk Test Statistic	0.869
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	25.6	95% H-UCL	34.74
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	38.42
95% Adjusted-CLT UCL	24.67	97.5% Chebyshev (MVUE) UCL	46.08
95% Modified-t UCL	25.55	99% Chebyshev (MVUE) UCL	61.13

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.969	Data appear Normal at 5% Significance Level	
Theta Star	6.791		
nu star	53.45		
Approximate Chi Square Value (.05)	37.65	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	24.97
Adjusted Chi Square Value	34.88	95% Jackknife UCL	25.6
		95% Standard Bootstrap UCL	24.66
Anderson-Darling Test Statistic	0.407	95% Bootstrap-t UCL	25.3
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	25.07
Kolmogorov-Smirnov Test Statistic	0.236	95% Percentile Bootstrap UCL	24.53
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	24.32
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	32.9
		97.5% Chebyshev(Mean, Sd) UCL	38.41
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	49.23
95% Approximate Gamma UCL	28.63		
95% Adjusted Gamma UCL	30.91		

Potential UCL to Use	Use 95% Student's-t UCL	25.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_47	101-07-129	5	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2260	Minimum of Log Data	7.723
Maximum	9620	Maximum of Log Data	9.172
Mean	5117	Mean of log Data	8.455
Median	4830	SD of log Data	0.443
SD	2233		
Coefficient of Variation	0.436		
Skewness	0.841		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.942	Shapiro Wilk Test Statistic	0.98
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6501	95% H-UCL	7333
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8460
95% Adjusted-CLT UCL	6564	97.5% Chebyshev (MVUE) UCL	9903
95% Modified-t UCL	6535	99% Chebyshev (MVUE) UCL	12738

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.1	Data appear Normal at 5% Significance Level	
Theta Star	1248		
nu star	73.79		
Approximate Chi Square Value (.05)	55.01	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6341
Adjusted Chi Square Value	51.61	95% Jackknife UCL	6501
		95% Standard Bootstrap UCL	6279
Anderson-Darling Test Statistic	0.19	95% Bootstrap-t UCL	6859
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	6950
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	6356
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	6498
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8361
		97.5% Chebyshev(Mean, Sd) UCL	9765
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	12522
95% Approximate Gamma UCL	6864		
95% Adjusted Gamma UCL	7317		

Potential UCL to Use		Use 95% Student's-t UCL	6501

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_48	101-07-129	5	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	71.9	Minimum of Log Data	4.275
Maximum	348	Maximum of Log Data	5.852
Mean	217.9	Mean of log Data	5.268
Median	187	SD of log Data	0.536
SD	102.2		
Coefficient of Variation	0.469		
Skewness	0.129		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.918	Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	281.2	95% H-UCL	350.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	394.6
95% Adjusted-CLT UCL	275.5	97.5% Chebyshev (MVUE) UCL	470.1
95% Modified-t UCL	281.5	99% Chebyshev (MVUE) UCL	618.3

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.066	Data appear Normal at 5% Significance Level	
Theta Star	71.05		
nu star	55.19		
Approximate Chi Square Value (.05)	39.12	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	273.9
Adjusted Chi Square Value	36.29	95% Jackknife UCL	281.2
		95% Standard Bootstrap UCL	271.8
Anderson-Darling Test Statistic	0.297	95% Bootstrap-t UCL	283.6
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	266.9
Kolmogorov-Smirnov Test Statistic	0.18	95% Percentile Bootstrap UCL	272.7
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	271.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	366.4
		97.5% Chebyshev(Mean, Sd) UCL	430.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	556.9
95% Approximate Gamma UCL	307.4		
95% Adjusted Gamma UCL	331.4		

Potential UCL to Use		Use 95% Student's-t UCL	281.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_49	101-07-301	5	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13.7	Minimum of Log Data	2.617
Maximum	24.6	Maximum of Log Data	3.203
Mean	20.22	Mean of log Data	2.991
Median	19.4	SD of log Data	0.194
SD	3.691		
Coefficient of Variation	0.183		
Skewness	-0.521		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.926	Shapiro Wilk Test Statistic	0.908
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	22.51	95% H-UCL	23.13
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	25.97
95% Adjusted-CLT UCL	22.02	97.5% Chebyshev (MVUE) UCL	28.45
95% Modified-t UCL	22.47	99% Chebyshev (MVUE) UCL	33.32
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	20.91	Data appear Normal at 5% Significance Level	
Theta Star	0.967		
nu star	376.4		
Approximate Chi Square Value (.05)	332.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	22.25
Adjusted Chi Square Value	323.7	95% Jackknife UCL	22.51
		95% Standard Bootstrap UCL	22.14
Anderson-Darling Test Statistic	0.393	95% Bootstrap-t UCL	22.31
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	21.98
Kolmogorov-Smirnov Test Statistic	0.216	95% Percentile Bootstrap UCL	22.08
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	22.08
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	25.59
		97.5% Chebyshev(Mean, Sd) UCL	27.91
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	32.46
95% Approximate Gamma UCL	22.9		
95% Adjusted Gamma UCL	23.51		
Potential UCL to Use		Use 95% Student's-t UCL	22.51

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_50	101-07-301	5	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4890	Minimum of Log Data	8.495
Maximum	12000	Maximum of Log Data	9.393
Mean	8071	Mean of log Data	8.964
Median	8170	SD of log Data	0.272
SD	2149		
Coefficient of Variation	0.266		
Skewness	0.41		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.973	Shapiro Wilk Test Statistic	0.977
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	9403	95% H-UCL	9824
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11282
95% Adjusted-CLT UCL	9354	97.5% Chebyshev (MVUE) UCL	12669
95% Modified-t UCL	9419	99% Chebyshev (MVUE) UCL	15394
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	10.54	Data appear Normal at 5% Significance Level	
Theta Star	765.6		
nu star	189.8		
Approximate Chi Square Value (.05)	158.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	9249
Adjusted Chi Square Value	152.9	95% Jackknife UCL	9403
		95% Standard Bootstrap UCL	9175
Anderson-Darling Test Statistic	0.189	95% Bootstrap-t UCL	9513
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	9948
Kolmogorov-Smirnov Test Statistic	0.14	95% Percentile Bootstrap UCL	9267
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	9343
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	11193
		97.5% Chebyshev(Mean, Sd) UCL	12544
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15197
95% Approximate Gamma UCL	9639		
95% Adjusted Gamma UCL	10015		
Potential UCL to Use		Use 95% Student's-t UCL	9403

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_51	101-07-301	5	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	118	Minimum of Log Data	4.771
Maximum	941	Maximum of Log Data	6.847
Mean	247.6	Mean of log Data	5.266
Median	166	SD of log Data	0.613
SD	261.1		
Coefficient of Variation	1.055		
Skewness	2.951		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.478	Shapiro Wilk Test Statistic	0.637
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	409.4	95% H-UCL	401.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	435.6
95% Adjusted-CLT UCL	482.2	97.5% Chebyshev (MVUE) UCL	525.3
95% Modified-t UCL	423.7	99% Chebyshev (MVUE) UCL	701.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.535	Data do not follow a Discernable Distribution (0.05)	
Theta Star	161.3		
nu star	27.63		
Approximate Chi Square Value (.05)	16.64	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	390.7
Adjusted Chi Square Value	14.87	95% Jackknife UCL	409.4
		95% Standard Bootstrap UCL	381.9
Anderson-Darling Test Statistic	1.841	95% Bootstrap-t UCL	1455
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	1326
Kolmogorov-Smirnov Test Statistic	0.454	95% Percentile Bootstrap UCL	419.8
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	506.7
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	627
		97.5% Chebyshev(Mean, Sd) UCL	791.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1114
95% Approximate Gamma UCL	411		
95% Adjusted Gamma UCL	460		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	627

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_52	101-07-303	5	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5	Minimum of Log Data	1.609
Maximum	20.7	Maximum of Log Data	3.03
Mean	10.91	Mean of log Data	2.281
Median	9.4	SD of log Data	0.503
SD	5.28		
Coefficient of Variation	0.484		
Skewness	0.61		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.928	Shapiro Wilk Test Statistic	0.936
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	14.18	95% H-UCL	16.74
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	19.04
95% Adjusted-CLT UCL	14.19	97.5% Chebyshev (MVUE) UCL	22.55
95% Modified-t UCL	14.24	99% Chebyshev (MVUE) UCL	29.44
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.246	Data appear Normal at 5% Significance Level	
Theta Star	3.361		
nu star	58.43		
Approximate Chi Square Value (.05)	41.85	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	13.81
Adjusted Chi Square Value	38.91	95% Jackknife UCL	14.18
		95% Standard Bootstrap UCL	13.6
Anderson-Darling Test Statistic	0.294	95% Bootstrap-t UCL	14.63
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	14.29
Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	13.69
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	13.89
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	18.58
		97.5% Chebyshev(Mean, Sd) UCL	21.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	28.42
95% Approximate Gamma UCL	15.23		
95% Adjusted Gamma UCL	16.38		
Potential UCL to Use		Use 95% Student's-t UCL	14.18

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_53	101-07-303	5	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	726	Minimum of Log Data	6.588
Maximum	17200	Maximum of Log Data	9.753
Mean	4714	Mean of log Data	7.849
Median	2430	SD of log Data	1.143
SD	5848		
Coefficient of Variation	1.241		
Skewness	1.693		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.719	Shapiro Wilk Test Statistic	0.91
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	8339	95% H-UCL	21419
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	12106
95% Adjusted-CLT UCL	9096	97.5% Chebyshev (MVUE) UCL	15421
95% Modified-t UCL	8522	99% Chebyshev (MVUE) UCL	21934

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.709	Data appear Gamma Distributed at 5% Significance Level
Theta Star	6650	
nu star	12.76	
Approximate Chi Square Value (.05)	5.731	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 7920
Adjusted Chi Square Value	4.776	95% Jackknife UCL 8339
		95% Standard Bootstrap UCL 7757
Anderson-Darling Test Statistic	0.59	95% Bootstrap-t UCL 19678
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL 27351
Kolmogorov-Smirnov Test Statistic	0.231	95% Percentile Bootstrap UCL 7993
Kolmogorov-Smirnov 5% Critical Value	0.287	95% BCA Bootstrap UCL 8830
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 13211
		97.5% Chebyshev(Mean, Sd) UCL 16887
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 24109
95% Approximate Gamma UCL	10494	
95% Adjusted Gamma UCL	12594	

Potential UCL to Use		Use 95% Approximate Gamma UCL	10494

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_54	101-07-303	5	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	25	Minimum of Log Data	3.219
Maximum	258	Maximum of Log Data	5.553
Mean	89.52	Mean of log Data	4.229
Median	62.7	SD of log Data	0.74
SD	77.06		
Coefficient of Variation	0.861		
Skewness	1.709		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.765	Shapiro Wilk Test Statistic	0.939
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	137.3	95% H-UCL	184.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	183.2
95% Adjusted-CLT UCL	147.4	97.5% Chebyshev (MVUE) UCL	224.7
95% Modified-t UCL	139.7	99% Chebyshev (MVUE) UCL	306.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.432	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	62.53		
nu star	25.77		
Approximate Chi Square Value (.05)	15.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	131.8
Adjusted Chi Square Value	13.52	95% Jackknife UCL	137.3
		95% Standard Bootstrap UCL	129
Anderson-Darling Test Statistic	0.539	95% Bootstrap-t UCL	256.6
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	426.6
Kolmogorov-Smirnov Test Statistic	0.267	95% Percentile Bootstrap UCL	133.4
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	141.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	201.5
		97.5% Chebyshev(Mean, Sd) UCL	249.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	345.1
95% Approximate Gamma UCL	151.8		
95% Adjusted Gamma UCL	170.6		

Potential UCL to Use		Use 95% Approximate Gamma UCL	151.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_55	101-07-304A	5	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3.5	Minimum of Log Data	1.253
Maximum	34.8	Maximum of Log Data	3.55
Mean	17.89	Mean of log Data	2.674
Median	13.1	SD of log Data	0.744
SD	10.85		
Coefficient of Variation	0.606		
Skewness	0.27		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.92
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	24.61	95% H-UCL	39.38
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	38.92
95% Adjusted-CLT UCL	24.18	97.5% Chebyshev (MVUE) UCL	47.78
95% Modified-t UCL	24.67	99% Chebyshev (MVUE) UCL	65.18

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.766	Data appear Normal at 5% Significance Level	
Theta Star	10.13		
nu star	31.78		
Approximate Chi Square Value (.05)	19.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	23.84
Adjusted Chi Square Value	17.94	95% Jackknife UCL	24.61
		95% Standard Bootstrap UCL	23.56
Anderson-Darling Test Statistic	0.356	95% Bootstrap-t UCL	25.01
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	23.27
Kolmogorov-Smirnov Test Statistic	0.211	95% Percentile Bootstrap UCL	23.68
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	23.92
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	33.65
		97.5% Chebyshev(Mean, Sd) UCL	40.47
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	53.86
95% Approximate Gamma UCL	28.57		
95% Adjusted Gamma UCL	31.69		

Potential UCL to Use	Use 95% Student's-t UCL	24.61

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_56	101-07-304A	5	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	879	Minimum of Log Data	6.779
Maximum	10700	Maximum of Log Data	9.278
Mean	4523	Mean of log Data	8.156
Median	2870	SD of log Data	0.803
SD	3267		
Coefficient of Variation	0.722		
Skewness	0.818		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6548	95% H-UCL	10834
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10125
95% Adjusted-CLT UCL	6632	97.5% Chebyshev (MVUE) UCL	12514
95% Modified-t UCL	6598	99% Chebyshev (MVUE) UCL	17208

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.451	Data appear Normal at 5% Significance Level	
Theta Star	3117		
nu star	26.12		
Approximate Chi Square Value (.05)	15.47	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6314
Adjusted Chi Square Value	13.77	95% Jackknife UCL	6548
		95% Standard Bootstrap UCL	6233
Anderson-Darling Test Statistic	0.33	95% Bootstrap-t UCL	7127
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	6400
Kolmogorov-Smirnov Test Statistic	0.199	95% Percentile Bootstrap UCL	6291
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	6428
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9270
		97.5% Chebyshev(Mean, Sd) UCL	11324
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15358
95% Approximate Gamma UCL	7636		
95% Adjusted Gamma UCL	8578		

Potential UCL to Use		Use 95% Student's-t UCL	6548

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_57	101-07-304A	5	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	22.2	Minimum of Log Data	3.1
Maximum	195	Maximum of Log Data	5.273
Mean	97.4	Mean of log Data	4.37
Median	103	SD of log Data	0.748
SD	57.37		
Coefficient of Variation	0.589		
Skewness	0.174		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Test Statistic	0.898
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	133	95% H-UCL	216.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	213.1
95% Adjusted-CLT UCL	130	97.5% Chebyshev (MVUE) UCL	261.7
95% Modified-t UCL	133.1	99% Chebyshev (MVUE) UCL	357.2

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.771	Data appear Normal at 5% Significance Level	
Theta Star	54.98		
nu star	31.89		
Approximate Chi Square Value (.05)	19.98	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	128.9
Adjusted Chi Square Value	18.02	95% Jackknife UCL	133
		95% Standard Bootstrap UCL	127.2
Anderson-Darling Test Statistic	0.429	95% Bootstrap-t UCL	135.3
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	130.3
Kolmogorov-Smirnov Test Statistic	0.209	95% Percentile Bootstrap UCL	127
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	128.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	180.8
		97.5% Chebyshev(Mean, Sd) UCL	216.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	287.7
95% Approximate Gamma UCL	155.4		
95% Adjusted Gamma UCL	172.3		

Potential UCL to Use		Use 95% Student's-t UCL	133

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_58	101-07-111	6	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3	Minimum of Log Data	1.099
Maximum	21.3	Maximum of Log Data	3.059
Mean	11.57	Mean of log Data	2.294
Median	11	SD of log Data	0.635
SD	6.052		
Coefficient of Variation	0.523		
Skewness	0.207		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.98	Shapiro Wilk Test Statistic	0.945
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	15.32	95% H-UCL	21.43
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	22.97
95% Adjusted-CLT UCL	15.03	97.5% Chebyshev (MVUE) UCL	27.79
95% Modified-t UCL	15.34	99% Chebyshev (MVUE) UCL	37.26

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.341	Data appear Normal at 5% Significance Level	
Theta Star	4.941		
nu star	42.14		
Approximate Chi Square Value (.05)	28.26	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	14.88
Adjusted Chi Square Value	25.88	95% Jackknife UCL	15.32
		95% Standard Bootstrap UCL	14.62
Anderson-Darling Test Statistic	0.172	95% Bootstrap-t UCL	15.57
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	15.28
Kolmogorov-Smirnov Test Statistic	0.115	95% Percentile Bootstrap UCL	14.61
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	14.59
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	20.36
		97.5% Chebyshev(Mean, Sd) UCL	24.16
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	31.64
95% Approximate Gamma UCL	17.25		
95% Adjusted Gamma UCL	18.83		

Potential UCL to Use	Use 95% Student's-t UCL	15.32

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_59	101-07-111	6	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1220	Minimum of Log Data	7.107
Maximum	9500	Maximum of Log Data	9.159
Mean	4673	Mean of log Data	8.266
Median	4640	SD of log Data	0.675
SD	2787		
Coefficient of Variation	0.596		
Skewness	0.512		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.943	Shapiro Wilk Test Statistic	0.955
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6401	95% H-UCL	9105
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9506
95% Adjusted-CLT UCL	6371	97.5% Chebyshev (MVUE) UCL	11566
95% Modified-t UCL	6427	99% Chebyshev (MVUE) UCL	15613

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.993	Data appear Normal at 5% Significance Level
Theta Star	2345	
nu star	35.87	
Approximate Chi Square Value (.05)	23.17	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 6202
Adjusted Chi Square Value	21.04	95% Jackknife UCL 6401
		95% Standard Bootstrap UCL 6100
Anderson-Darling Test Statistic	0.24	95% Bootstrap-t UCL 6533
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL 6402
Kolmogorov-Smirnov Test Statistic	0.165	95% Percentile Bootstrap UCL 6119
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 6246
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 8723
		97.5% Chebyshev(Mean, Sd) UCL 10476
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 13918
95% Approximate Gamma UCL	7237	
95% Adjusted Gamma UCL	7969	

Potential UCL to Use	Use 95% Student's-t UCL	6401

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_60	101-07-111	6	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	19.2	Minimum of Log Data	2.955
Maximum	150	Maximum of Log Data	5.011
Mean	71.18	Mean of log Data	4.05
Median	55.9	SD of log Data	0.719
SD	47.13		
Coefficient of Variation	0.662		
Skewness	0.648		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.904	Shapiro Wilk Test Statistic	0.95
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	100.4	95% H-UCL	147.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	148.7
95% Adjusted-CLT UCL	100.6	97.5% Chebyshev (MVUE) UCL	182
95% Modified-t UCL	101	99% Chebyshev (MVUE) UCL	247.3

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.724	Data appear Normal at 5% Significance Level	
Theta Star	41.29		
nu star	31.03		
Approximate Chi Square Value (.05)	19.31	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	97.02
Adjusted Chi Square Value	17.38	95% Jackknife UCL	100.4
		95% Standard Bootstrap UCL	95.66
Anderson-Darling Test Statistic	0.277	95% Bootstrap-t UCL	106
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	96.65
Kolmogorov-Smirnov Test Statistic	0.165	95% Percentile Bootstrap UCL	97.17
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	99.29
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	139.7
		97.5% Chebyshev(Mean, Sd) UCL	169.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	227.5
95% Approximate Gamma UCL	114.4		
95% Adjusted Gamma UCL	127.1		

Potential UCL to Use		Use 95% Student's-t UCL	100.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_61	101-07-117	6	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	16.3	Minimum of Log Data	2.791
Maximum	42.6	Maximum of Log Data	3.752
Mean	29.58	Mean of log Data	3.328
Median	26.2	SD of log Data	0.37
SD	10.34		
Coefficient of Variation	0.35		
Skewness	0.0826		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.893	Shapiro Wilk Test Statistic	0.898
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	35.99	95% H-UCL	39.41
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	45.72
95% Adjusted-CLT UCL	35.35	97.5% Chebyshev (MVUE) UCL	52.69
95% Modified-t UCL	36	99% Chebyshev (MVUE) UCL	66.36

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.874	Data appear Normal at 5% Significance Level	
Theta Star	5.035		
nu star	105.7		
Approximate Chi Square Value (.05)	83.01	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	35.25
Adjusted Chi Square Value	78.77	95% Jackknife UCL	35.99
		95% Standard Bootstrap UCL	35
Anderson-Darling Test Statistic	0.417	95% Bootstrap-t UCL	36.27
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	34.39
Kolmogorov-Smirnov Test Statistic	0.204	95% Percentile Bootstrap UCL	34.88
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	35.07
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	44.6
		97.5% Chebyshev(Mean, Sd) UCL	51.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	63.87
95% Approximate Gamma UCL	37.68		
95% Adjusted Gamma UCL	39.7		

Potential UCL to Use		Use 95% Student's-t UCL	35.99

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_62	101-07-117	6	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2580	Minimum of Log Data	7.856
Maximum	13800	Maximum of Log Data	9.532
Mean	8723	Mean of log Data	8.95
Median	9080	SD of log Data	0.567
SD	4077		
Coefficient of Variation	0.467		
Skewness	-0.0823		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.928	Shapiro Wilk Test Statistic	0.908
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	11250	95% H-UCL	14677
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	16311
95% Adjusted-CLT UCL	10919	97.5% Chebyshev (MVUE) UCL	19529
95% Modified-t UCL	11244	99% Chebyshev (MVUE) UCL	25850
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.874	Data appear Normal at 5% Significance Level	
Theta Star	3035		
nu star	51.73		
Approximate Chi Square Value (.05)	36.21	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	10959
Adjusted Chi Square Value	33.49	95% Jackknife UCL	11250
		95% Standard Bootstrap UCL	10877
Anderson-Darling Test Statistic	0.325	95% Bootstrap-t UCL	11391
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	10783
Kolmogorov-Smirnov Test Statistic	0.187	95% Percentile Bootstrap UCL	10882
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	10892
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14647
		97.5% Chebyshev(Mean, Sd) UCL	17210
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	22245
95% Approximate Gamma UCL	12462		
95% Adjusted Gamma UCL	13474		
Potential UCL to Use		Use 95% Student's-t UCL	11250

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_63	101-07-117	6	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	53.4	Minimum of Log Data	3.978
Maximum	389	Maximum of Log Data	5.964
Mean	242.2	Mean of log Data	5.349
Median	228	SD of log Data	0.63
SD	113.1		
Coefficient of Variation	0.467		
Skewness	-0.32		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.865
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	312.3	95% H-UCL	450
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	483.9
95% Adjusted-CLT UCL	299.9	97.5% Chebyshev (MVUE) UCL	585
95% Modified-t UCL	311.6	99% Chebyshev (MVUE) UCL	783.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.55	Data appear Normal at 5% Significance Level	
Theta Star	94.95		
nu star	45.9		
Approximate Chi Square Value (.05)	31.36	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	304.2
Adjusted Chi Square Value	28.85	95% Jackknife UCL	312.3
		95% Standard Bootstrap UCL	299.6
Anderson-Darling Test Statistic	0.398	95% Bootstrap-t UCL	306.9
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	295.1
Kolmogorov-Smirnov Test Statistic	0.209	95% Percentile Bootstrap UCL	298.8
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	297.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	406.5
		97.5% Chebyshev(Mean, Sd) UCL	477.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	617.3
95% Approximate Gamma UCL	354.5		
95% Adjusted Gamma UCL	385.4		

Potential UCL to Use		Use 95% Student's-t UCL	312.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_64	101-07-284	6	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	10.8	Minimum of Log Data	2.38
Maximum	20.7	Maximum of Log Data	3.03
Mean	15.82	Mean of log Data	2.738
Median	16.5	SD of log Data	0.232
SD	3.454		
Coefficient of Variation	0.218		
Skewness	-0.326		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.915
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	17.96	95% H-UCL	18.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21.19
95% Adjusted-CLT UCL	17.58	97.5% Chebyshev (MVUE) UCL	23.51
95% Modified-t UCL	17.94	99% Chebyshev (MVUE) UCL	28.06

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	14.73	Data appear Normal at 5% Significance Level	
Theta Star	1.074		
nu star	265.1		
Approximate Chi Square Value (.05)	228.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	17.72
Adjusted Chi Square Value	221.2	95% Jackknife UCL	17.96
		95% Standard Bootstrap UCL	17.58
Anderson-Darling Test Statistic	0.345	95% Bootstrap-t UCL	17.78
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	17.5
Kolmogorov-Smirnov Test Statistic	0.172	95% Percentile Bootstrap UCL	17.49
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	17.41
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	20.84
		97.5% Chebyshev(Mean, Sd) UCL	23.01
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	27.28
95% Approximate Gamma UCL	18.36		
95% Adjusted Gamma UCL	18.96		

Potential UCL to Use		Use 95% Student's-t UCL	17.96

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_65	101-07-284	6	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3390	Minimum of Log Data	8.129
Maximum	7100	Maximum of Log Data	8.868
Mean	5742	Mean of log Data	8.633
Median	6230	SD of log Data	0.236
SD	1187		
Coefficient of Variation	0.207		
Skewness	-1.094		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.904	Shapiro Wilk Test Statistic	0.851
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6478	95% H-UCL	6795
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7734
95% Adjusted-CLT UCL	6239	97.5% Chebyshev (MVUE) UCL	8590
95% Modified-t UCL	6454	99% Chebyshev (MVUE) UCL	10273

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	14.94	Data appear Normal at 5% Significance Level	
Theta Star	384.4		
nu star	268.9		
Approximate Chi Square Value (.05)	231.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6393
Adjusted Chi Square Value	224.6	95% Jackknife UCL	6478
		95% Standard Bootstrap UCL	6354
Anderson-Darling Test Statistic	0.572	95% Bootstrap-t UCL	6341
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	6253
Kolmogorov-Smirnov Test Statistic	0.233	95% Percentile Bootstrap UCL	6330
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6250
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7467
		97.5% Chebyshev(Mean, Sd) UCL	8213
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9679
95% Approximate Gamma UCL	6658		
95% Adjusted Gamma UCL	6873		

Potential UCL to Use		Use 95% Student's-t UCL	6478

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_66	101-07-284	6	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	71.1	Minimum of Log Data	4.264
Maximum	224	Maximum of Log Data	5.412
Mean	142.8	Mean of log Data	4.917
Median	136	SD of log Data	0.326
SD	43.85		
Coefficient of Variation	0.307		
Skewness	0.353		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.979	Shapiro Wilk Test Statistic	0.963
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	170	95% H-UCL	182.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	211.4
95% Adjusted-CLT UCL	168.7	97.5% Chebyshev (MVUE) UCL	241
95% Modified-t UCL	170.3	99% Chebyshev (MVUE) UCL	299.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.62	Data appear Normal at 5% Significance Level	
Theta Star	18.74		
nu star	137.2		
Approximate Chi Square Value (.05)	111.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	166.8
Adjusted Chi Square Value	106.2	95% Jackknife UCL	170
		95% Standard Bootstrap UCL	165.6
Anderson-Darling Test Statistic	0.199	95% Bootstrap-t UCL	174.6
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	181.4
Kolmogorov-Smirnov Test Statistic	0.125	95% Percentile Bootstrap UCL	166.1
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	167.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	206.5
		97.5% Chebyshev(Mean, Sd) UCL	234.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	288.2
95% Approximate Gamma UCL	176.3		
95% Adjusted Gamma UCL	184.5		

Potential UCL to Use		Use 95% Student's-t UCL	170

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_67	101-07-286	6	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13	Minimum of Log Data	2.565
Maximum	23.8	Maximum of Log Data	3.17
Mean	17.99	Mean of log Data	2.87
Median	17	SD of log Data	0.211
SD	3.844		
Coefficient of Variation	0.214		
Skewness	0.489		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.908	Shapiro Wilk Test Statistic	0.928
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20.37	95% H-UCL	20.82
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	23.51
95% Adjusted-CLT UCL	20.32	97.5% Chebyshev (MVUE) UCL	25.91
95% Modified-t UCL	20.41	99% Chebyshev (MVUE) UCL	30.61

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	16.91	Data appear Normal at 5% Significance Level	
Theta Star	1.064		
nu star	304.4		
Approximate Chi Square Value (.05)	265	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	20.1
Adjusted Chi Square Value	257.3	95% Jackknife UCL	20.37
		95% Standard Bootstrap UCL	19.93
Anderson-Darling Test Statistic	0.395	95% Bootstrap-t UCL	21.01
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	20.76
Kolmogorov-Smirnov Test Statistic	0.229	95% Percentile Bootstrap UCL	20.04
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	20.19
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	23.57
		97.5% Chebyshev(Mean, Sd) UCL	25.99
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	30.74
95% Approximate Gamma UCL	20.66		
95% Adjusted Gamma UCL	21.29		

Potential UCL to Use		Use 95% Student's-t UCL	20.37

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_68	101-07-286	6	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1460	Minimum of Log Data	7.286
Maximum	8230	Maximum of Log Data	9.016
Mean	5518	Mean of log Data	8.506
Median	5660	SD of log Data	0.555
SD	2272		
Coefficient of Variation	0.412		
Skewness	-0.587		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Test Statistic	0.849
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6926	95% H-UCL	9216
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10295
95% Adjusted-CLT UCL	6605	97.5% Chebyshev (MVUE) UCL	12302
95% Modified-t UCL	6901	99% Chebyshev (MVUE) UCL	16244

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.213	Data appear Normal at 5% Significance Level	
Theta Star	1717		
nu star	57.84		
Approximate Chi Square Value (.05)	41.36	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6763
Adjusted Chi Square Value	38.43	95% Jackknife UCL	6926
		95% Standard Bootstrap UCL	6698
Anderson-Darling Test Statistic	0.435	95% Bootstrap-t UCL	6788
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	6620
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL	6677
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	6569
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8818
		97.5% Chebyshev(Mean, Sd) UCL	10246
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	13052
95% Approximate Gamma UCL	7717		
95% Adjusted Gamma UCL	8304		

Potential UCL to Use		Use 95% Student's-t UCL	6926

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_69	101-07-286	6	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	33.5	Minimum of Log Data	3.512
Maximum	262	Maximum of Log Data	5.568
Mean	179.7	Mean of log Data	5.063
Median	189	SD of log Data	0.637
SD	72.28		
Coefficient of Variation	0.402		
Skewness	-0.994		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.93	Shapiro Wilk Test Statistic	0.752
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	224.5	95% H-UCL	342.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	366.9
95% Adjusted-CLT UCL	210.8	97.5% Chebyshev (MVUE) UCL	444
95% Modified-t UCL	223.2	99% Chebyshev (MVUE) UCL	595.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.772	Data appear Normal at 5% Significance Level	
Theta Star	64.84		
nu star	49.89		
Approximate Chi Square Value (.05)	34.67	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	219.4
Adjusted Chi Square Value	32.02	95% Jackknife UCL	224.5
		95% Standard Bootstrap UCL	216.3
Anderson-Darling Test Statistic	0.679	95% Bootstrap-t UCL	217.1
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	213
Kolmogorov-Smirnov Test Statistic	0.249	95% Percentile Bootstrap UCL	214.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	211.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	284.7
		97.5% Chebyshev(Mean, Sd) UCL	330.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	419.4
95% Approximate Gamma UCL	258.6		
95% Adjusted Gamma UCL	280		

Potential UCL to Use		Use 95% Student's-t UCL	224.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_70	101-07-099	7	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	11.1	Minimum of Log Data	2.407
Maximum	91.9	Maximum of Log Data	4.521
Mean	43.31	Mean of log Data	3.608
Median	41.6	SD of log Data	0.649
SD	23.61		
Coefficient of Variation	0.545		
Skewness	0.754		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.922	Shapiro Wilk Test Statistic	0.9
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	57.95	95% H-UCL	81.89
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	87.05
95% Adjusted-CLT UCL	58.37	97.5% Chebyshev (MVUE) UCL	105.5
95% Modified-t UCL	58.28	99% Chebyshev (MVUE) UCL	141.8

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.262	Data appear Normal at 5% Significance Level	
Theta Star	19.14		
nu star	40.72		
Approximate Chi Square Value (.05)	27.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	56.26
Adjusted Chi Square Value	24.78	95% Jackknife UCL	57.95
		95% Standard Bootstrap UCL	55.62
Anderson-Darling Test Statistic	0.416	95% Bootstrap-t UCL	59.99
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	65.74
Kolmogorov-Smirnov Test Statistic	0.218	95% Percentile Bootstrap UCL	55.77
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	56.58
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	77.62
		97.5% Chebyshev(Mean, Sd) UCL	92.47
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	121.6
95% Approximate Gamma UCL	65.08		
95% Adjusted Gamma UCL	71.18		

Potential UCL to Use		Use 95% Student's-t UCL	57.95

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_71	101-07-099	7	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	3020	Minimum of Log Data	8.013
Maximum	18000	Maximum of Log Data	9.798
Mean	11616	Mean of log Data	9.234
Median	11400	SD of log Data	0.592
SD	5122		
Coefficient of Variation	0.441		
Skewness	-0.507		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.941	Shapiro Wilk Test Statistic	0.854
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	14791	95% H-UCL	20416
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	22413
95% Adjusted-CLT UCL	14116	97.5% Chebyshev (MVUE) UCL	26944
95% Modified-t UCL	14743	99% Chebyshev (MVUE) UCL	35845

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.824	Data appear Normal at 5% Significance Level	
Theta Star	4113		
nu star	50.83		
Approximate Chi Square Value (.05)	35.46	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	14424
Adjusted Chi Square Value	32.77	95% Jackknife UCL	14791
		95% Standard Bootstrap UCL	14317
Anderson-Darling Test Statistic	0.476	95% Bootstrap-t UCL	14497
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	14051
Kolmogorov-Smirnov Test Statistic	0.234	95% Percentile Bootstrap UCL	14222
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	14069
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	19058
		97.5% Chebyshev(Mean, Sd) UCL	22279
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	28605
95% Approximate Gamma UCL	16651		
95% Adjusted Gamma UCL	18017		

Potential UCL to Use		Use 95% Student's-t UCL	14791

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_72	101-07-099	7	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	104	Minimum of Log Data	4.644
Maximum	688	Maximum of Log Data	6.534
Mean	296.4	Mean of log Data	5.552
Median	252	SD of log Data	0.555
SD	177.2		
Coefficient of Variation	0.598		
Skewness	1.528		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.86	Shapiro Wilk Test Statistic	0.979
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	406.3	95% H-UCL	480.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	536.7
95% Adjusted-CLT UCL	425.7	97.5% Chebyshev (MVUE) UCL	641.4
95% Modified-t UCL	411.3	99% Chebyshev (MVUE) UCL	846.9

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.559	Data appear Normal at 5% Significance Level	
Theta Star	115.9		
nu star	46.06		
Approximate Chi Square Value (.05)	31.49	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	393.6
Adjusted Chi Square Value	28.97	95% Jackknife UCL	406.3
		95% Standard Bootstrap UCL	388.3
Anderson-Darling Test Statistic	0.28	95% Bootstrap-t UCL	515.9
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	997.4
Kolmogorov-Smirnov Test Statistic	0.192	95% Percentile Bootstrap UCL	393.6
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	420.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	553.9
		97.5% Chebyshev(Mean, Sd) UCL	665.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	884.1
95% Approximate Gamma UCL	433.6		
95% Adjusted Gamma UCL	471.3		

Potential UCL to Use		Use 95% Student's-t UCL	406.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_73	101-07-104	7	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	10.3	Minimum of Log Data	2.332
Maximum	25.4	Maximum of Log Data	3.235
Mean	18.02	Mean of log Data	2.848
Median	18	SD of log Data	0.322
SD	5.366		
Coefficient of Variation	0.298		
Skewness	-0.179		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Test Statistic	0.93
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	21.35	95% H-UCL	22.95
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	26.56
95% Adjusted-CLT UCL	20.85	97.5% Chebyshev (MVUE) UCL	30.23
95% Modified-t UCL	21.33	99% Chebyshev (MVUE) UCL	37.45

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.831	Data appear Normal at 5% Significance Level	
Theta Star	2.301		
nu star	141		
Approximate Chi Square Value (.05)	114.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	20.96
Adjusted Chi Square Value	109.5	95% Jackknife UCL	21.35
		95% Standard Bootstrap UCL	20.83
Anderson-Darling Test Statistic	0.293	95% Bootstrap-t UCL	21.27
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	20.66
Kolmogorov-Smirnov Test Statistic	0.181	95% Percentile Bootstrap UCL	20.8
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	20.77
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	25.82
		97.5% Chebyshev(Mean, Sd) UCL	29.19
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	35.82
95% Approximate Gamma UCL	22.18		
95% Adjusted Gamma UCL	23.2		

Potential UCL to Use		Use 95% Student's-t UCL	21.35

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_74	101-07-104	7	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1760	Minimum of Log Data	7.473
Maximum	18800	Maximum of Log Data	9.842
Mean	6960	Mean of log Data	8.657
Median	5590	SD of log Data	0.658
SD	4934		
Coefficient of Variation	0.709		
Skewness	1.944		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.808	Shapiro Wilk Test Statistic	0.971
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10019	95% H-UCL	12982
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13719
95% Adjusted-CLT UCL	10804	97.5% Chebyshev (MVUE) UCL	16651
95% Modified-t UCL	10196	99% Chebyshev (MVUE) UCL	22412

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.92	Data appear Gamma Distributed at 5% Significance Level
Theta Star	3625	
nu star	34.56	
Approximate Chi Square Value (.05)	22.11	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 9665
Adjusted Chi Square Value	20.04	95% Jackknife UCL 10019
		95% Standard Bootstrap UCL 9520
Anderson-Darling Test Statistic	0.296	95% Bootstrap-t UCL 12412
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL 22222
Kolmogorov-Smirnov Test Statistic	0.18	95% Percentile Bootstrap UCL 9902
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL 10450
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 14130
		97.5% Chebyshev(Mean, Sd) UCL 17232
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 23326
95% Approximate Gamma UCL	10878	
95% Adjusted Gamma UCL	12004	

Potential UCL to Use		Use 95% Approximate Gamma UCL	10878

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_75	101-07-104	7	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	37	Minimum of Log Data	3.611
Maximum	630	Maximum of Log Data	6.446
Mean	156	Mean of log Data	4.657
Median	70	SD of log Data	0.849
SD	185.5		
Coefficient of Variation	1.189		
Skewness	2.566		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.63	Shapiro Wilk Test Statistic	0.892
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	271	95% H-UCL	367.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	326.4
95% Adjusted-CLT UCL	314.2	97.5% Chebyshev (MVUE) UCL	405.5
95% Modified-t UCL	279.8	99% Chebyshev (MVUE) UCL	560.9

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.018	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	153.3	
nu star	18.32	
Approximate Chi Square Value (.05)	9.62	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 257.7
Adjusted Chi Square Value	8.324	95% Jackknife UCL 271
		95% Standard Bootstrap UCL 253
Anderson-Darling Test Statistic	0.788	95% Bootstrap-t UCL 517.3
Anderson-Darling 5% Critical Value	0.736	95% Hall's Bootstrap UCL 600.4
Kolmogorov-Smirnov Test Statistic	0.262	95% Percentile Bootstrap UCL 265.2
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL 312.8
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 425.5
		97.5% Chebyshev(Mean, Sd) UCL 542.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 771.1
95% Approximate Gamma UCL	297	
95% Adjusted Gamma UCL	343.3	

Potential UCL to Use		Use 95% Approximate Gamma UCL	297

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_76	101-07-270	7	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	9	Minimum of Log Data	2.197
Maximum	80.3	Maximum of Log Data	4.386
Mean	39.72	Mean of log Data	3.356
Median	38.9	SD of log Data	0.918
SD	28.94		
Coefficient of Variation	0.729		
Skewness	0.139		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.848	Shapiro Wilk Test Statistic	0.832
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	57.66	95% H-UCL	120
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	97.9
95% Adjusted-CLT UCL	56.07	97.5% Chebyshev (MVUE) UCL	122.4
95% Modified-t UCL	57.74	99% Chebyshev (MVUE) UCL	170.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.196	Data appear Normal at 5% Significance Level	
Theta Star	33.22		
nu star	21.53		
Approximate Chi Square Value (.05)	11.98	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	55.59
Adjusted Chi Square Value	10.51	95% Jackknife UCL	57.66
		95% Standard Bootstrap UCL	54.67
Anderson-Darling Test Statistic	0.735	95% Bootstrap-t UCL	57.83
Anderson-Darling 5% Critical Value	0.733	95% Hall's Bootstrap UCL	52.6
Kolmogorov-Smirnov Test Statistic	0.256	95% Percentile Bootstrap UCL	55.08
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	55.59
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	81.78
		97.5% Chebyshev(Mean, Sd) UCL	99.97
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	135.7
95% Approximate Gamma UCL	71.35		
95% Adjusted Gamma UCL	81.33		

Potential UCL to Use		Use 95% Student's-t UCL	57.66

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_77	101-07-270	7	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1160	Minimum of Log Data	7.056
Maximum	17500	Maximum of Log Data	9.77
Mean	10552	Mean of log Data	8.925
Median	15200	SD of log Data	1.005
SD	7029		
Coefficient of Variation	0.666		
Skewness	-0.314		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.799	Shapiro Wilk Test Statistic	0.822
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	14909	95% H-UCL	40468
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29074
95% Adjusted-CLT UCL	14144	97.5% Chebyshev (MVUE) UCL	36649
95% Modified-t UCL	14868	99% Chebyshev (MVUE) UCL	51529
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.156	Data do not follow a Discernable Distribution (0.05)	
Theta Star	9131		
nu star	20.8		
Approximate Chi Square Value (.05)	11.44	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	14406
Adjusted Chi Square Value	10.01	95% Jackknife UCL	14909
		95% Standard Bootstrap UCL	14190
Anderson-Darling Test Statistic	0.826	95% Bootstrap-t UCL	14423
Anderson-Darling 5% Critical Value	0.733	95% Hall's Bootstrap UCL	13448
Kolmogorov-Smirnov Test Statistic	0.329	95% Percentile Bootstrap UCL	13863
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL	13841
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	20765
		97.5% Chebyshev(Mean, Sd) UCL	25185
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	33865
95% Approximate Gamma UCL	19180		
95% Adjusted Gamma UCL	21924		

Potential UCL to Use	Use 99% Chebyshev (Mean, Sd) UCL	33865
Recommended UCL exceeds the maximum observation		

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_78	101-07-270	7	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	34.6	Minimum of Log Data	3.544
Maximum	1340	Maximum of Log Data	7.2
Mean	512.6	Mean of log Data	5.712
Median	315	SD of log Data	1.207
SD	496.9		
Coefficient of Variation	0.969		
Skewness	1.058		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.823	Shapiro Wilk Test Statistic	0.945
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	820.6	95% H-UCL	3165
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1572
95% Adjusted-CLT UCL	847.5	97.5% Chebyshev (MVUE) UCL	2011
95% Modified-t UCL	830.4	99% Chebyshev (MVUE) UCL	2874

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.797	Data appear Gamma Distributed at 5% Significance Level
Theta Star	643.2	
nu star	14.35	
Approximate Chi Square Value (.05)	6.808	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 785.1
Adjusted Chi Square Value	5.75	95% Jackknife UCL 820.6
		95% Standard Bootstrap UCL 765.4
Anderson-Darling Test Statistic	0.279	95% Bootstrap-t UCL 1082
Anderson-Darling 5% Critical Value	0.742	95% Hall's Bootstrap UCL 1061
Kolmogorov-Smirnov Test Statistic	0.148	95% Percentile Bootstrap UCL 782
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL 826.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 1235
		97.5% Chebyshev(Mean, Sd) UCL 1547
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 2161
95% Approximate Gamma UCL	1080	
95% Adjusted Gamma UCL	1279	

Potential UCL to Use		Use 95% Approximate Gamma UCL	1080

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_79	101-07-090	8	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	14.9	Minimum of Log Data	2.701
Maximum	68.9	Maximum of Log Data	4.233
Mean	37.34	Mean of log Data	3.506
Median	37.8	SD of log Data	0.529
SD	17.77		
Coefficient of Variation	0.476		
Skewness	0.381		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.959	Shapiro Wilk Test Statistic	0.936
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	48.36	95% H-UCL	59.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	67.04
95% Adjusted-CLT UCL	47.89	97.5% Chebyshev (MVUE) UCL	79.75
95% Modified-t UCL	48.48	99% Chebyshev (MVUE) UCL	104.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.098	Data appear Normal at 5% Significance Level	
Theta Star	12.05		
nu star	55.77		
Approximate Chi Square Value (.05)	39.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	47.09
Adjusted Chi Square Value	36.75	95% Jackknife UCL	48.36
		95% Standard Bootstrap UCL	46.39
Anderson-Darling Test Statistic	0.238	95% Bootstrap-t UCL	49.17
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	48.96
Kolmogorov-Smirnov Test Statistic	0.151	95% Percentile Bootstrap UCL	46.73
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	46.64
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	63.16
		97.5% Chebyshev(Mean, Sd) UCL	74.33
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	96.28
95% Approximate Gamma UCL	52.58		
95% Adjusted Gamma UCL	56.67		

Potential UCL to Use		Use 95% Student's-t UCL	48.36

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_80	101-07-090	8	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	6770	Minimum of Log Data	8.82
Maximum	21200	Maximum of Log Data	9.962
Mean	12970	Mean of log Data	9.401
Median	13200	SD of log Data	0.404
SD	4968		
Coefficient of Variation	0.383		
Skewness	0.301		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Test Statistic	0.945
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	16050	95% H-UCL	17860
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	20700
95% Adjusted-CLT UCL	15872	97.5% Chebyshev (MVUE) UCL	24031
95% Modified-t UCL	16077	99% Chebyshev (MVUE) UCL	30576
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.972	Data appear Normal at 5% Significance Level	
Theta Star	2608		
nu star	89.5		
Approximate Chi Square Value (.05)	68.69	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	15694
Adjusted Chi Square Value	64.85	95% Jackknife UCL	16050
		95% Standard Bootstrap UCL	15542
Anderson-Darling Test Statistic	0.239	95% Bootstrap-t UCL	16171
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	16183
Kolmogorov-Smirnov Test Statistic	0.149	95% Percentile Bootstrap UCL	15629
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	15662
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	20189
		97.5% Chebyshev(Mean, Sd) UCL	23312
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	29448
95% Approximate Gamma UCL	16900		
95% Adjusted Gamma UCL	17899		
Potential UCL to Use		Use 95% Student's-t UCL	16050

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_81	101-07-090	8	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	38.8	Minimum of Log Data	3.658
Maximum	319	Maximum of Log Data	5.765
Mean	188.5	Mean of log Data	5.102
Median	195	SD of log Data	0.633
SD	85.37		
Coefficient of Variation	0.453		
Skewness	-0.271		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.992	Shapiro Wilk Test Statistic	0.859
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	241.4	95% H-UCL	353.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	379.6
95% Adjusted-CLT UCL	232.6	97.5% Chebyshev (MVUE) UCL	459.1
95% Modified-t UCL	241	99% Chebyshev (MVUE) UCL	615.3

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.609	Data appear Normal at 5% Significance Level	
Theta Star	72.27		
nu star	46.96		
Approximate Chi Square Value (.05)	32.23	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	235.3
Adjusted Chi Square Value	29.68	95% Jackknife UCL	241.4
		95% Standard Bootstrap UCL	233.3
Anderson-Darling Test Statistic	0.343	95% Bootstrap-t UCL	238.9
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	236
Kolmogorov-Smirnov Test Statistic	0.163	95% Percentile Bootstrap UCL	231.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	227.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	312.6
		97.5% Chebyshev(Mean, Sd) UCL	366.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	471.7
95% Approximate Gamma UCL	274.7		
95% Adjusted Gamma UCL	298.3		

Potential UCL to Use		Use 95% Student's-t UCL	241.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_82	101-07-091	8	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3.1	Minimum of Log Data	1.131
Maximum	72.9	Maximum of Log Data	4.289
Mean	28.28	Mean of log Data	2.795
Median	20.5	SD of log Data	1.215
SD	26.95		
Coefficient of Variation	0.953		
Skewness	0.812		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.847	Shapiro Wilk Test Statistic	0.907
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	44.98	95% H-UCL	176.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	86.15
95% Adjusted-CLT UCL	45.65	97.5% Chebyshev (MVUE) UCL	110.3
95% Modified-t UCL	45.39	99% Chebyshev (MVUE) UCL	157.7
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.774	Data appear Normal at 5% Significance Level	
Theta Star	36.53		
nu star	13.93		
Approximate Chi Square Value (.05)	6.525	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	43.05
Adjusted Chi Square Value	5.493	95% Jackknife UCL	44.98
		95% Standard Bootstrap UCL	42.73
Anderson-Darling Test Statistic	0.371	95% Bootstrap-t UCL	51.53
Anderson-Darling 5% Critical Value	0.743	95% Hall's Bootstrap UCL	44.11
Kolmogorov-Smirnov Test Statistic	0.175	95% Percentile Bootstrap UCL	42.64
Kolmogorov-Smirnov 5% Critical Value	0.287	95% BCA Bootstrap UCL	44.91
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	67.43
		97.5% Chebyshev(Mean, Sd) UCL	84.38
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	117.7
95% Approximate Gamma UCL	60.38		
95% Adjusted Gamma UCL	71.73		
Potential UCL to Use		Use 95% Student's-t UCL	44.98

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_83	101-07-091	8	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1330	Minimum of Log Data	7.193
Maximum	33300	Maximum of Log Data	10.41
Mean	10176	Mean of log Data	8.642
Median	7300	SD of log Data	1.186
SD	11285		
Coefficient of Variation	1.109		
Skewness	1.433		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.795	Shapiro Wilk Test Statistic	0.924
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17171	95% H-UCL	55033
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	28545
95% Adjusted-CLT UCL	18283	97.5% Chebyshev (MVUE) UCL	36469
95% Modified-t UCL	17470	99% Chebyshev (MVUE) UCL	52035

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.732	Data appear Gamma Distributed at 5% Significance Level
Theta Star	13893	
nu star	13.18	
Approximate Chi Square Value (.05)	6.016	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 16363
Adjusted Chi Square Value	5.033	95% Jackknife UCL 17171
		95% Standard Bootstrap UCL 15941
Anderson-Darling Test Statistic	0.397	95% Bootstrap-t UCL 26823
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL 51264
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL 16803
Kolmogorov-Smirnov 5% Critical Value	0.287	95% BCA Bootstrap UCL 17411
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 26572
		97.5% Chebyshev(Mean, Sd) UCL 33667
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 47604
95% Approximate Gamma UCL	22298	
95% Adjusted Gamma UCL	26656	

Potential UCL to Use		Use 95% Approximate Gamma UCL	22298

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_84	101-07-091	8	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	24.1	Minimum of Log Data	3.182
Maximum	358	Maximum of Log Data	5.881
Mean	123.6	Mean of log Data	4.349
Median	57.5	SD of log Data	1.063
SD	117.3		
Coefficient of Variation	0.949		
Skewness	1.018		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.815	Shapiro Wilk Test Statistic	0.856
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	196.3	95% H-UCL	497.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	325.2
95% Adjusted-CLT UCL	202.1	97.5% Chebyshev (MVUE) UCL	411.9
95% Modified-t UCL	198.5	99% Chebyshev (MVUE) UCL	582.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.879	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	140.6		
nu star	15.82		
Approximate Chi Square Value (.05)	7.835	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	187.9
Adjusted Chi Square Value	6.685	95% Jackknife UCL	196.3
		95% Standard Bootstrap UCL	183.8
Anderson-Darling Test Statistic	0.694	95% Bootstrap-t UCL	215
Anderson-Darling 5% Critical Value	0.74	95% Hall's Bootstrap UCL	194.8
Kolmogorov-Smirnov Test Statistic	0.235	95% Percentile Bootstrap UCL	193.5
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL	196.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	294
		97.5% Chebyshev(Mean, Sd) UCL	367.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	512.5
95% Approximate Gamma UCL	249.5		
95% Adjusted Gamma UCL	292.5		

Potential UCL to Use		Use 95% Approximate Gamma UCL	249.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_85	101-07-092A	8	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	6.1	Minimum of Log Data	1.808
Maximum	44.1	Maximum of Log Data	3.786
Mean	22.81	Mean of log Data	2.939
Median	15.9	SD of log Data	0.681
SD	13.7		
Coefficient of Variation	0.601		
Skewness	0.34		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.897	Shapiro Wilk Test Statistic	0.922
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	31.3	95% H-UCL	44.77
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	46.54
95% Adjusted-CLT UCL	30.88	97.5% Chebyshev (MVUE) UCL	56.67
95% Modified-t UCL	31.39	99% Chebyshev (MVUE) UCL	76.58

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.947	Data appear Normal at 5% Significance Level	
Theta Star	11.71		
nu star	35.05		
Approximate Chi Square Value (.05)	22.51	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	30.32
Adjusted Chi Square Value	20.41	95% Jackknife UCL	31.3
		95% Standard Bootstrap UCL	29.92
Anderson-Darling Test Statistic	0.431	95% Bootstrap-t UCL	31.86
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	29.05
Kolmogorov-Smirnov Test Statistic	0.212	95% Percentile Bootstrap UCL	29.96
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	30.19
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	42.72
		97.5% Chebyshev(Mean, Sd) UCL	51.33
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	68.26
95% Approximate Gamma UCL	35.53		
95% Adjusted Gamma UCL	39.17		

Potential UCL to Use	Use 95% Student's-t UCL	31.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_86	101-07-092A	8	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1600	Minimum of Log Data	7.378
Maximum	14400	Maximum of Log Data	9.575
Mean	7638	Mean of log Data	8.787
Median	7460	SD of log Data	0.649
SD	3936		
Coefficient of Variation	0.515		
Skewness	0.341		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.975	Shapiro Wilk Test Statistic	0.91
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10077	95% H-UCL	14542
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15455
95% Adjusted-CLT UCL	9955	97.5% Chebyshev (MVUE) UCL	18736
95% Modified-t UCL	10102	99% Chebyshev (MVUE) UCL	25181

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.351	Data appear Normal at 5% Significance Level	
Theta Star	3249		
nu star	42.32		
Approximate Chi Square Value (.05)	28.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	9796
Adjusted Chi Square Value	26.02	95% Jackknife UCL	10077
		95% Standard Bootstrap UCL	9644
Anderson-Darling Test Statistic	0.233	95% Bootstrap-t UCL	10347
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	10294
Kolmogorov-Smirnov Test Statistic	0.148	95% Percentile Bootstrap UCL	9709
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	9688
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13356
		97.5% Chebyshev(Mean, Sd) UCL	15830
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	20690
95% Approximate Gamma UCL	11379		
95% Adjusted Gamma UCL	12420		

Potential UCL to Use		Use 95% Student's-t UCL	10077

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_87	101-07-092A	8	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	35.1	Minimum of Log Data	3.558
Maximum	276	Maximum of Log Data	5.62
Mean	146.4	Mean of log Data	4.725
Median	101	SD of log Data	0.811
SD	99.62		
Coefficient of Variation	0.681		
Skewness	0.196		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.838	Shapiro Wilk Test Statistic	0.876
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	208.1	95% H-UCL	357.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	331.3
95% Adjusted-CLT UCL	203.3	97.5% Chebyshev (MVUE) UCL	409.8
95% Modified-t UCL	208.5	99% Chebyshev (MVUE) UCL	564.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.45	Data appear Normal at 5% Significance Level	
Theta Star	101		
nu star	26.1		
Approximate Chi Square Value (.05)	15.45	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	201
Adjusted Chi Square Value	13.76	95% Jackknife UCL	208.1
		95% Standard Bootstrap UCL	197.8
Anderson-Darling Test Statistic	0.605	95% Bootstrap-t UCL	208.8
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	188.1
Kolmogorov-Smirnov Test Statistic	0.269	95% Percentile Bootstrap UCL	197.3
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	198.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	291.1
		97.5% Chebyshev(Mean, Sd) UCL	353.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	476.8
95% Approximate Gamma UCL	247.2		
95% Adjusted Gamma UCL	277.7		
Potential UCL to Use		Use 95% Student's-t UCL	208.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_88	101-07-105	8	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	9.5	Minimum of Log Data	2.251
Maximum	44.4	Maximum of Log Data	3.793
Mean	27.14	Mean of log Data	3.222
Median	24.8	SD of log Data	0.449
SD	10.48		
Coefficient of Variation	0.386		
Skewness	0.174		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Test Statistic	0.903
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	33.64	95% H-UCL	39.47
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	45.49
95% Adjusted-CLT UCL	33.11	97.5% Chebyshev (MVUE) UCL	53.31
95% Modified-t UCL	33.67	99% Chebyshev (MVUE) UCL	68.68
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.409	Data appear Normal at 5% Significance Level	
Theta Star	6.156		
nu star	79.36		
Approximate Chi Square Value (.05)	59.84	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	32.89
Adjusted Chi Square Value	56.28	95% Jackknife UCL	33.64
		95% Standard Bootstrap UCL	32.57
Anderson-Darling Test Statistic	0.328	95% Bootstrap-t UCL	34.66
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	35.12
Kolmogorov-Smirnov Test Statistic	0.204	95% Percentile Bootstrap UCL	32.74
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	32.94
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	42.37
		97.5% Chebyshev(Mean, Sd) UCL	48.96
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	61.9
95% Approximate Gamma UCL	36		
95% Adjusted Gamma UCL	38.28		
Potential UCL to Use		Use 95% Student's-t UCL	33.64

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_89	101-07-105	8	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3530	Minimum of Log Data	8.169
Maximum	31600	Maximum of Log Data	10.36
Mean	10543	Mean of log Data	9.092
Median	8540	SD of log Data	0.572
SD	8151		
Coefficient of Variation	0.773		
Skewness	2.635		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.62	Shapiro Wilk Test Statistic	0.835
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	15596	95% H-UCL	17074
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18928
95% Adjusted-CLT UCL	17562	97.5% Chebyshev (MVUE) UCL	22682
95% Modified-t UCL	15994	99% Chebyshev (MVUE) UCL	30057

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.12	Data appear Lognormal at 5% Significance Level	
Theta Star	4974		
nu star	38.15		
Approximate Chi Square Value (.05)	25.01	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	15012
Adjusted Chi Square Value	22.79	95% Jackknife UCL	15596
		95% Standard Bootstrap UCL	14798
Anderson-Darling Test Statistic	1.07	95% Bootstrap-t UCL	25325
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	40686
Kolmogorov-Smirnov Test Statistic	0.334	95% Percentile Bootstrap UCL	15456
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	16784
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	22387
		97.5% Chebyshev(Mean, Sd) UCL	27511
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	37577
95% Approximate Gamma UCL	16085		
95% Adjusted Gamma UCL	17653		

Potential UCL to Use		Use 95% H-UCL	17074

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_90	101-07-105	8	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	59.1	Minimum of Log Data	4.079
Maximum	1740	Maximum of Log Data	7.462
Mean	414.5	Mean of log Data	5.509
Median	206	SD of log Data	1.026
SD	527.6		
Coefficient of Variation	1.273		
Skewness	2.418		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.676	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	741.5	95% H-UCL	1415
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	983.7
95% Adjusted-CLT UCL	855.2	97.5% Chebyshev (MVUE) UCL	1242
95% Modified-t UCL	765.1	99% Chebyshev (MVUE) UCL	1750

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.809	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	512.3		
nu star	14.56		
Approximate Chi Square Value (.05)	6.958	Nonparametric Statistics	
Adjusted Level of Significance	0.0231	95% CLT UCL	703.7
Adjusted Chi Square Value	5.886	95% Jackknife UCL	741.5
		95% Standard Bootstrap UCL	685.5
Anderson-Darling Test Statistic	0.466	95% Bootstrap-t UCL	1435
Anderson-Darling 5% Critical Value	0.742	95% Hall's Bootstrap UCL	1802
Kolmogorov-Smirnov Test Statistic	0.182	95% Percentile Bootstrap UCL	738.9
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL	873.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1181
		97.5% Chebyshev(Mean, Sd) UCL	1513
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2164
95% Approximate Gamma UCL	867.4		
95% Adjusted Gamma UCL	1025		

Potential UCL to Use		Use 95% Approximate Gamma UCL	867.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_91	101-07-110	8	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3.3	Minimum of Log Data	1.194
Maximum	25.1	Maximum of Log Data	3.223
Mean	10.56	Mean of log Data	2.187
Median	9.2	SD of log Data	0.634
SD	6.584		
Coefficient of Variation	0.624		
Skewness	1.386		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.875	Shapiro Wilk Test Statistic	0.94
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	14.64	95% H-UCL	19.22
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	20.61
95% Adjusted-CLT UCL	15.25	97.5% Chebyshev (MVUE) UCL	24.93
95% Modified-t UCL	14.81	99% Chebyshev (MVUE) UCL	33.42

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.139	Data appear Normal at 5% Significance Level	
Theta Star	4.935		
nu star	38.5		
Approximate Chi Square Value (.05)	25.29	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	14.17
Adjusted Chi Square Value	23.06	95% Jackknife UCL	14.64
		95% Standard Bootstrap UCL	14.01
Anderson-Darling Test Statistic	0.317	95% Bootstrap-t UCL	17.08
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	37.24
Kolmogorov-Smirnov Test Statistic	0.163	95% Percentile Bootstrap UCL	14.02
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	14.88
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	20.12
		97.5% Chebyshev(Mean, Sd) UCL	24.26
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	32.39
95% Approximate Gamma UCL	16.07		
95% Adjusted Gamma UCL	17.63		

Potential UCL to Use		Use 95% Student's-t UCL	14.64

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_92	101-07-110	8	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	746	Minimum of Log Data	6.615
Maximum	7550	Maximum of Log Data	8.929
Mean	3690	Mean of log Data	8.017
Median	3480	SD of log Data	0.721
SD	2195		
Coefficient of Variation	0.595		
Skewness	0.497		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.969	Shapiro Wilk Test Statistic	0.956
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5050	95% H-UCL	7821
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7883
95% Adjusted-CLT UCL	5022	97.5% Chebyshev (MVUE) UCL	9649
95% Modified-t UCL	5070	99% Chebyshev (MVUE) UCL	13119

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.874	Data appear Normal at 5% Significance Level	
Theta Star	1969		
nu star	33.74		
Approximate Chi Square Value (.05)	21.45	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4893
Adjusted Chi Square Value	19.41	95% Jackknife UCL	5050
		95% Standard Bootstrap UCL	4806
Anderson-Darling Test Statistic	0.146	95% Bootstrap-t UCL	5249
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	5335
Kolmogorov-Smirnov Test Statistic	0.134	95% Percentile Bootstrap UCL	4801
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	4862
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6878
		97.5% Chebyshev(Mean, Sd) UCL	8258
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10968
95% Approximate Gamma UCL	5802		
95% Adjusted Gamma UCL	6412		

Potential UCL to Use		Use 95% Student's-t UCL	5050

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_93	101-07-110	8	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	10.8	Minimum of Log Data	2.38
Maximum	93	Maximum of Log Data	4.533
Mean	40.48	Mean of log Data	3.525
Median	35.7	SD of log Data	0.65
SD	25.34		
Coefficient of Variation	0.626		
Skewness	1.209		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk Test Statistic	0.955
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	56.18	95% H-UCL	75.51
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	80.19
95% Adjusted-CLT UCL	58.01	97.5% Chebyshev (MVUE) UCL	97.24
95% Modified-t UCL	56.75	99% Chebyshev (MVUE) UCL	130.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.07	Data appear Normal at 5% Significance Level	
Theta Star	19.56		
nu star	37.26		
Approximate Chi Square Value (.05)	24.28	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	54.37
Adjusted Chi Square Value	22.1	95% Jackknife UCL	56.18
		95% Standard Bootstrap UCL	53.65
Anderson-Darling Test Statistic	0.307	95% Bootstrap-t UCL	69.64
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	159.5
Kolmogorov-Smirnov Test Statistic	0.217	95% Percentile Bootstrap UCL	54.82
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	57.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	77.3
		97.5% Chebyshev(Mean, Sd) UCL	93.23
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	124.5
95% Approximate Gamma UCL	62.11		
95% Adjusted Gamma UCL	68.25		

Potential UCL to Use		Use 95% Student's-t UCL	56.18

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_94	101-07-035AN	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	12.8	Minimum of Log Data	2.549
Maximum	67.3	Maximum of Log Data	4.209
Mean	27	Mean of log Data	3.116
Median	18.7	SD of log Data	0.59
SD	19.78		
Coefficient of Variation	0.733		
Skewness	1.637		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.696	Shapiro Wilk Test Statistic	0.803
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	39.26	95% H-UCL	44.72
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	49.17
95% Adjusted-CLT UCL	41.69	97.5% Chebyshev (MVUE) UCL	59.08
95% Modified-t UCL	39.86	99% Chebyshev (MVUE) UCL	78.55
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.027	Data do not follow a Discernable Distribution (0.05)	
Theta Star	13.32		
nu star	36.49		
Approximate Chi Square Value (.05)	23.66	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	37.84
Adjusted Chi Square Value	21.51	95% Jackknife UCL	39.26
		95% Standard Bootstrap UCL	37.53
Anderson-Darling Test Statistic	1.085	95% Bootstrap-t UCL	93.68
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	134.1
Kolmogorov-Smirnov Test Statistic	0.351	95% Percentile Bootstrap UCL	37.83
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	39.64
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	55.74
		97.5% Chebyshev(Mean, Sd) UCL	68.17
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	92.6
95% Approximate Gamma UCL	41.64		
95% Adjusted Gamma UCL	45.8		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	55.74

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_95	101-07-035AN	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	7220	Minimum of Log Data	8.885
Maximum	31100	Maximum of Log Data	10.34
Mean	12916	Mean of log Data	9.339
Median	9020	SD of log Data	0.497
SD	7997		
Coefficient of Variation	0.619		
Skewness	1.86		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.729	Shapiro Wilk Test Statistic	0.827
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	17872	95% H-UCL	19263
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21959
95% Adjusted-CLT UCL	19066	97.5% Chebyshev (MVUE) UCL	25975
95% Modified-t UCL	18148	99% Chebyshev (MVUE) UCL	33864

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.8	Data do not follow a Discernable Distribution (0.05)	
Theta Star	4612		
nu star	50.41		
Approximate Chi Square Value (.05)	35.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	17300
Adjusted Chi Square Value	32.43	95% Jackknife UCL	17872
		95% Standard Bootstrap UCL	17117
Anderson-Darling Test Statistic	0.896	95% Bootstrap-t UCL	29943
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	36559
Kolmogorov-Smirnov Test Statistic	0.314	95% Percentile Bootstrap UCL	17563
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	18784
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24534
		97.5% Chebyshev(Mean, Sd) UCL	29562
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	39437
95% Approximate Gamma UCL	18546		
95% Adjusted Gamma UCL	20075		

Potential UCL to Use		
	Use 95% Student's-t UCL	17872
	or 95% Modified-t UCL	18148

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_96	101-07-035AN	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	14.1	Minimum of Log Data	2.646
Maximum	156	Maximum of Log Data	5.05
Mean	84.42	Mean of log Data	4.213
Median	78.4	SD of log Data	0.785
SD	50.9		
Coefficient of Variation	0.603		
Skewness	0.13		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.93	Shapiro Wilk Test Statistic	0.908
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	116	95% H-UCL	201.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	191.6
95% Adjusted-CLT UCL	113.1	97.5% Chebyshev (MVUE) UCL	236.3
95% Modified-t UCL	116.1	99% Chebyshev (MVUE) UCL	324.2
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.671	Data appear Normal at 5% Significance Level	
Theta Star	50.53		
nu star	30.08		
Approximate Chi Square Value (.05)	18.55	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	112.3
Adjusted Chi Square Value	16.67	95% Jackknife UCL	116
		95% Standard Bootstrap UCL	110.4
Anderson-Darling Test Statistic	0.322	95% Bootstrap-t UCL	117.6
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	108.5
Kolmogorov-Smirnov Test Statistic	0.174	95% Percentile Bootstrap UCL	112.3
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	112.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	158.4
		97.5% Chebyshev(Mean, Sd) UCL	190.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	253.2
95% Approximate Gamma UCL	136.9		
95% Adjusted Gamma UCL	152.3		
Potential UCL to Use		Use 95% Student's-t UCL	116

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_97	101-07-037	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	9.9	Minimum of Log Data	2.293
Maximum	83.6	Maximum of Log Data	4.426
Mean	42.97	Mean of log Data	3.623
Median	40.4	SD of log Data	0.612
SD	21.19		
Coefficient of Variation	0.493		
Skewness	0.465		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.977	Shapiro Wilk Test Statistic	0.914
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	56.1	95% H-UCL	77.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	84.1
95% Adjusted-CLT UCL	55.76	97.5% Chebyshev (MVUE) UCL	101.4
95% Modified-t UCL	56.28	99% Chebyshev (MVUE) UCL	135.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.599	Data appear Normal at 5% Significance Level	
Theta Star	16.53		
nu star	46.78		
Approximate Chi Square Value (.05)	32.09	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	54.59
Adjusted Chi Square Value	29.54	95% Jackknife UCL	56.1
		95% Standard Bootstrap UCL	53.78
Anderson-Darling Test Statistic	0.245	95% Bootstrap-t UCL	56.29
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	59.28
Kolmogorov-Smirnov Test Statistic	0.173	95% Percentile Bootstrap UCL	53.21
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	54.78
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	73.76
		97.5% Chebyshev(Mean, Sd) UCL	87.08
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	113.3
95% Approximate Gamma UCL	62.64		
95% Adjusted Gamma UCL	68.04		

Potential UCL to Use		Use 95% Student's-t UCL	56.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_98	101-07-037	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2270	Minimum of Log Data	7.728
Maximum	23900	Maximum of Log Data	10.08
Mean	12518	Mean of log Data	9.274
Median	11600	SD of log Data	0.68
SD	6376		
Coefficient of Variation	0.509		
Skewness	0.3		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.98	Shapiro Wilk Test Statistic	0.874
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	16470	95% H-UCL	25224
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	26238
95% Adjusted-CLT UCL	16241	97.5% Chebyshev (MVUE) UCL	31947
95% Modified-t UCL	16505	99% Chebyshev (MVUE) UCL	43160

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.256	Data appear Normal at 5% Significance Level
Theta Star	5548	
nu star	40.62	
Approximate Chi Square Value (.05)	27.01	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 16014
Adjusted Chi Square Value	24.69	95% Jackknife UCL 16470
		95% Standard Bootstrap UCL 15864
Anderson-Darling Test Statistic	0.296	95% Bootstrap-t UCL 16985
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL 17085
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL 15908
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 16216
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 21782
		97.5% Chebyshev(Mean, Sd) UCL 25791
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 33665
95% Approximate Gamma UCL	18822	
95% Adjusted Gamma UCL	20588	

Potential UCL to Use	Use 95% Student's-t UCL	16470

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_99	101-07-037	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	83.1	Minimum of Log Data	4.42
Maximum	3270	Maximum of Log Data	8.093
Mean	658.1	Mean of log Data	5.873
Median	383	SD of log Data	1.07
SD	1001		
Coefficient of Variation	1.521		
Skewness	2.768		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.577	Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1278	95% H-UCL	2336
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1509
95% Adjusted-CLT UCL	1536	97.5% Chebyshev (MVUE) UCL	1911
95% Modified-t UCL	1330	99% Chebyshev (MVUE) UCL	2703

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.703	Data appear Gamma Distributed at 5% Significance Level
Theta Star	936.8	
nu star	12.65	
Approximate Chi Square Value (.05)	5.655	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 1207
Adjusted Chi Square Value	4.707	95% Jackknife UCL 1278
		95% Standard Bootstrap UCL 1191
Anderson-Darling Test Statistic	0.688	95% Bootstrap-t UCL 3553
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL 3628
Kolmogorov-Smirnov Test Statistic	0.249	95% Percentile Bootstrap UCL 1280
Kolmogorov-Smirnov 5% Critical Value	0.287	95% BCA Bootstrap UCL 1625
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 2112
		97.5% Chebyshev(Mean, Sd) UCL 2741
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 3977
95% Approximate Gamma UCL	1472	
95% Adjusted Gamma UCL	1768	

Potential UCL to Use		Use 95% Approximate Gamma UCL	1472

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_100	101-07-040	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	11	Minimum of Log Data	2.398
Maximum	98.3	Maximum of Log Data	4.588
Mean	37.01	Mean of log Data	3.369
Median	29.8	SD of log Data	0.74
SD	28.2		
Coefficient of Variation	0.762		
Skewness	1.426		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.859	Shapiro Wilk Test Statistic	0.96
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	54.49	95% H-UCL	78.09
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	77.48
95% Adjusted-CLT UCL	57.24	97.5% Chebyshev (MVUE) UCL	95.06
95% Modified-t UCL	55.23	99% Chebyshev (MVUE) UCL	129.6

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.553	Data appear Normal at 5% Significance Level	
Theta Star	23.83		
nu star	27.95		
Approximate Chi Square Value (.05)	16.89	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	52.47
Adjusted Chi Square Value	15.11	95% Jackknife UCL	54.49
		95% Standard Bootstrap UCL	51.59
Anderson-Darling Test Statistic	0.247	95% Bootstrap-t UCL	65.53
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	77.86
Kolmogorov-Smirnov Test Statistic	0.157	95% Percentile Bootstrap UCL	53.11
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	56.62
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	77.98
		97.5% Chebyshev(Mean, Sd) UCL	95.71
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	130.5
95% Approximate Gamma UCL	61.25		
95% Adjusted Gamma UCL	68.49		

Potential UCL to Use		Use 95% Student's-t UCL	54.49

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_101	101-07-040	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3330	Minimum of Log Data	8.111
Maximum	41800	Maximum of Log Data	10.64
Mean	13983	Mean of log Data	9.291
Median	10700	SD of log Data	0.749
SD	11588		
Coefficient of Variation	0.829		
Skewness	1.985		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.794	Shapiro Wilk Test Statistic	0.985
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	21166	95% H-UCL	29751
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29276
95% Adjusted-CLT UCL	23067	97.5% Chebyshev (MVUE) UCL	35960
95% Modified-t UCL	21592	99% Chebyshev (MVUE) UCL	49090

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.484	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	9421		
nu star	26.72		
Approximate Chi Square Value (.05)	15.93	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	20337
Adjusted Chi Square Value	14.21	95% Jackknife UCL	21166
		95% Standard Bootstrap UCL	20108
Anderson-Darling Test Statistic	0.256	95% Bootstrap-t UCL	26535
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	46736
Kolmogorov-Smirnov Test Statistic	0.157	95% Percentile Bootstrap UCL	20891
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	22970
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	30821
		97.5% Chebyshev(Mean, Sd) UCL	38106
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	52417
95% Approximate Gamma UCL	23448		
95% Adjusted Gamma UCL	26300		

Potential UCL to Use		Use 95% Approximate Gamma UCL	23448

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_102	101-07-040	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	58.9	Minimum of Log Data	4.076
Maximum	362	Maximum of Log Data	5.892
Mean	144.3	Mean of log Data	4.812
Median	145	SD of log Data	0.583
SD	93.91		
Coefficient of Variation	0.651		
Skewness	1.713		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.813	Shapiro Wilk Test Statistic	0.931
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	202.5	95% H-UCL	241.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	266.1
95% Adjusted-CLT UCL	214.9	97.5% Chebyshev (MVUE) UCL	319.4
95% Modified-t UCL	205.5	99% Chebyshev (MVUE) UCL	424.2

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.271	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	63.53		
nu star	40.88		
Approximate Chi Square Value (.05)	27.23	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	195.8
Adjusted Chi Square Value	24.9	95% Jackknife UCL	202.5
		95% Standard Bootstrap UCL	193.2
Anderson-Darling Test Statistic	0.415	95% Bootstrap-t UCL	238
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	415.9
Kolmogorov-Smirnov Test Statistic	0.206	95% Percentile Bootstrap UCL	197.6
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	212.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	280.7
		97.5% Chebyshev(Mean, Sd) UCL	339.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	455.7
95% Approximate Gamma UCL	216.6		
95% Adjusted Gamma UCL	236.9		

Potential UCL to Use		Use 95% Approximate Gamma UCL	216.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_103	101-07-052	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	8	Minimum of Log Data	2.079
Maximum	56.2	Maximum of Log Data	4.029
Mean	27.7	Mean of log Data	3.185
Median	27	SD of log Data	0.585
SD	14.4		
Coefficient of Variation	0.52		
Skewness	0.692		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.961	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	36.63	95% H-UCL	47.54
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	52.38
95% Adjusted-CLT UCL	36.78	97.5% Chebyshev (MVUE) UCL	62.9
95% Modified-t UCL	36.81	99% Chebyshev (MVUE) UCL	83.56
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.621	Data appear Normal at 5% Significance Level	
Theta Star	10.57		
nu star	47.18		
Approximate Chi Square Value (.05)	32.42	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	35.6
Adjusted Chi Square Value	29.86	95% Jackknife UCL	36.63
		95% Standard Bootstrap UCL	35.17
Anderson-Darling Test Statistic	0.173	95% Bootstrap-t UCL	38.32
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	39.93
Kolmogorov-Smirnov Test Statistic	0.139	95% Percentile Bootstrap UCL	35.57
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	36.22
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	48.63
		97.5% Chebyshev(Mean, Sd) UCL	57.68
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	75.47
95% Approximate Gamma UCL	40.31		
95% Adjusted Gamma UCL	43.77		
Potential UCL to Use		Use 95% Student's-t UCL	36.63

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_104	101-07-052	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2480	Minimum of Log Data	7.816
Maximum	15900	Maximum of Log Data	9.674
Mean	8747	Mean of log Data	8.94
Median	9980	SD of log Data	0.594
SD	4348		
Coefficient of Variation	0.497		
Skewness	0.15		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.966	Shapiro Wilk Test Statistic	0.936
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	11442	95% H-UCL	15258
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	16736
95% Adjusted-CLT UCL	11208	97.5% Chebyshev (MVUE) UCL	20125
95% Modified-t UCL	11454	99% Chebyshev (MVUE) UCL	26783

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.615	Data appear Normal at 5% Significance Level	
Theta Star	3345		
nu star	47.07		
Approximate Chi Square Value (.05)	32.33	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	11131
Adjusted Chi Square Value	29.77	95% Jackknife UCL	11442
		95% Standard Bootstrap UCL	10966
Anderson-Darling Test Statistic	0.271	95% Bootstrap-t UCL	11448
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	11401
Kolmogorov-Smirnov Test Statistic	0.223	95% Percentile Bootstrap UCL	10977
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	11068
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15065
		97.5% Chebyshev(Mean, Sd) UCL	17799
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	23169
95% Approximate Gamma UCL	12736		
95% Adjusted Gamma UCL	13829		

Potential UCL to Use		Use 95% Student's-t UCL	11442

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_105	101-07-052	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	44.1	Minimum of Log Data	3.786
Maximum	363	Maximum of Log Data	5.894
Mean	173.7	Mean of log Data	4.974
Median	179	SD of log Data	0.682
SD	102.3		
Coefficient of Variation	0.589		
Skewness	0.554		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.947	Shapiro Wilk Test Statistic	0.946
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	237.1	95% H-UCL	342.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	356.4
95% Adjusted-CLT UCL	236.5	97.5% Chebyshev (MVUE) UCL	434
95% Modified-t UCL	238.2	99% Chebyshev (MVUE) UCL	586.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.997	Data appear Normal at 5% Significance Level	
Theta Star	86.99		
nu star	35.94		
Approximate Chi Square Value (.05)	23.22	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	229.8
Adjusted Chi Square Value	21.09	95% Jackknife UCL	237.1
		95% Standard Bootstrap UCL	225.3
Anderson-Darling Test Statistic	0.258	95% Bootstrap-t UCL	242.8
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	242.6
Kolmogorov-Smirnov Test Statistic	0.17	95% Percentile Bootstrap UCL	230.1
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	232.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	322.3
		97.5% Chebyshev(Mean, Sd) UCL	386.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	513
95% Approximate Gamma UCL	268.8		
95% Adjusted Gamma UCL	296		

Potential UCL to Use		Use 95% Student's-t UCL	237.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_106	101-07-060	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	11.6	Minimum of Log Data	2.451
Maximum	31.9	Maximum of Log Data	3.463
Mean	18.43	Mean of log Data	2.871
Median	15.9	SD of log Data	0.303
SD	6.169		
Coefficient of Variation	0.335		
Skewness	1.458		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.87	Shapiro Wilk Test Statistic	0.947
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	22.26	95% H-UCL	22.96
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	26.52
95% Adjusted-CLT UCL	22.88	97.5% Chebyshev (MVUE) UCL	30.04
95% Modified-t UCL	22.42	99% Chebyshev (MVUE) UCL	36.95

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.882	Data appear Normal at 5% Significance Level	
Theta Star	2.339		
nu star	141.9		
Approximate Chi Square Value (.05)	115.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	21.82
Adjusted Chi Square Value	110.3	95% Jackknife UCL	22.26
		95% Standard Bootstrap UCL	21.65
Anderson-Darling Test Statistic	0.381	95% Bootstrap-t UCL	25.33
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	40.71
Kolmogorov-Smirnov Test Statistic	0.209	95% Percentile Bootstrap UCL	21.96
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	22.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.4
		97.5% Chebyshev(Mean, Sd) UCL	31.27
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	38.89
95% Approximate Gamma UCL	22.67		
95% Adjusted Gamma UCL	23.71		

Potential UCL to Use		Use 95% Student's-t UCL	22.26

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_107	101-07-060	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3120	Minimum of Log Data	8.046
Maximum	8120	Maximum of Log Data	9.002
Mean	5483	Mean of log Data	8.563
Median	4620	SD of log Data	0.322
SD	1773		
Coefficient of Variation	0.323		
Skewness	0.537		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.897	Shapiro Wilk Test Statistic	0.928
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6582	95% H-UCL	6966
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8063
95% Adjusted-CLT UCL	6569	97.5% Chebyshev (MVUE) UCL	9180
95% Modified-t UCL	6600	99% Chebyshev (MVUE) UCL	11373

Gamma Distribution Test		Data Distribution
k star (bias corrected)	7.424	Data appear Normal at 5% Significance Level
Theta Star	738.5	
nu star	133.6	
Approximate Chi Square Value (.05)	107.9	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 6456
Adjusted Chi Square Value	103.1	95% Jackknife UCL 6582
		95% Standard Bootstrap UCL 6411
Anderson-Darling Test Statistic	0.418	95% Bootstrap-t UCL 6850
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL 6629
Kolmogorov-Smirnov Test Statistic	0.23	95% Percentile Bootstrap UCL 6430
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL 6452
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 8060
		97.5% Chebyshev(Mean, Sd) UCL 9175
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 11364
95% Approximate Gamma UCL	6789	
95% Adjusted Gamma UCL	7110	

Potential UCL to Use	Use 95% Student's-t UCL	6582

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_108	101-07-060	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	114	Minimum of Log Data	4.736
Maximum	1010	Maximum of Log Data	6.918
Mean	264.3	Mean of log Data	5.306
Median	161	SD of log Data	0.663
SD	283.5		
Coefficient of Variation	1.073		
Skewness	2.845		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.542	Shapiro Wilk Test Statistic	0.766
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	440.1	95% H-UCL	460.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	484.7
95% Adjusted-CLT UCL	515.6	97.5% Chebyshev (MVUE) UCL	588.8
95% Modified-t UCL	455	99% Chebyshev (MVUE) UCL	793.2

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.406	Data do not follow a Discernable Distribution (0.05)	
Theta Star	188.1		
nu star	25.3		
Approximate Chi Square Value (.05)	14.84	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	419.8
Adjusted Chi Square Value	13.18	95% Jackknife UCL	440.1
		95% Standard Bootstrap UCL	407.3
Anderson-Darling Test Statistic	1.242	95% Bootstrap-t UCL	1010
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	1059
Kolmogorov-Smirnov Test Statistic	0.334	95% Percentile Bootstrap UCL	439.6
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	535.7
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	676.3
		97.5% Chebyshev(Mean, Sd) UCL	854.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1205
95% Approximate Gamma UCL	450.6		
95% Adjusted Gamma UCL	507.4		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	676.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_109	101-07-061	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4.6	Minimum of Log Data	1.526
Maximum	44.3	Maximum of Log Data	3.791
Mean	16.61	Mean of log Data	2.563
Median	11.5	SD of log Data	0.718
SD	13.58		
Coefficient of Variation	0.818		
Skewness	1.542		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.764	Shapiro Wilk Test Statistic	0.925
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	25.03	95% H-UCL	33.27
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	33.61
95% Adjusted-CLT UCL	26.54	97.5% Chebyshev (MVUE) UCL	41.13
95% Modified-t UCL	25.42	99% Chebyshev (MVUE) UCL	55.89

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.526	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	10.88		
nu star	27.47		
Approximate Chi Square Value (.05)	16.52	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	24.06
Adjusted Chi Square Value	14.75	95% Jackknife UCL	25.03
		95% Standard Bootstrap UCL	23.93
Anderson-Darling Test Statistic	0.618	95% Bootstrap-t UCL	45.72
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	82.13
Kolmogorov-Smirnov Test Statistic	0.268	95% Percentile Bootstrap UCL	24.34
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	25.69
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	36.34
		97.5% Chebyshev(Mean, Sd) UCL	44.88
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	61.65
95% Approximate Gamma UCL	27.63		
95% Adjusted Gamma UCL	30.93		

Potential UCL to Use		Use 95% Approximate Gamma UCL	27.63

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_110	101-07-061	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1330	Minimum of Log Data	7.193
Maximum	8990	Maximum of Log Data	9.104
Mean	4277	Mean of log Data	8.24
Median	3560	SD of log Data	0.532
SD	2256		
Coefficient of Variation	0.527		
Skewness	1.254		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.866	Shapiro Wilk Test Statistic	0.923
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5675	95% H-UCL	6804
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7667
95% Adjusted-CLT UCL	5849	97.5% Chebyshev (MVUE) UCL	9127
95% Modified-t UCL	5727	99% Chebyshev (MVUE) UCL	11995

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.948	Data appear Normal at 5% Significance Level	
Theta Star	1451		
nu star	53.07		
Approximate Chi Square Value (.05)	37.33	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5513
Adjusted Chi Square Value	34.57	95% Jackknife UCL	5675
		95% Standard Bootstrap UCL	5439
Anderson-Darling Test Statistic	0.466	95% Bootstrap-t UCL	6959
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	15219
Kolmogorov-Smirnov Test Statistic	0.23	95% Percentile Bootstrap UCL	5483
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	5687
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7554
		97.5% Chebyshev(Mean, Sd) UCL	8973
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	11758
95% Approximate Gamma UCL	6079		
95% Adjusted Gamma UCL	6565		

Potential UCL to Use		Use 95% Student's-t UCL	5675

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_111	101-07-061	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	29.2	Minimum of Log Data	3.374
Maximum	276	Maximum of Log Data	5.62
Mean	88.59	Mean of log Data	4.201
Median	51.5	SD of log Data	0.728
SD	83.58		
Coefficient of Variation	0.943		
Skewness	1.887		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.676	Shapiro Wilk Test Statistic	0.818
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	140.4	95% H-UCL	174.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	175.2
95% Adjusted-CLT UCL	153.1	97.5% Chebyshev (MVUE) UCL	214.6
95% Modified-t UCL	143.3	99% Chebyshev (MVUE) UCL	292.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.354	Data do not follow a Discernable Distribution (0.05)	
Theta Star	65.45		
nu star	24.36		
Approximate Chi Square Value (.05)	14.13	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	134.4
Adjusted Chi Square Value	12.51	95% Jackknife UCL	140.4
		95% Standard Bootstrap UCL	131.3
Anderson-Darling Test Statistic	1.126	95% Bootstrap-t UCL	424.6
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	476.9
Kolmogorov-Smirnov Test Statistic	0.335	95% Percentile Bootstrap UCL	136.6
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	145.9
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	210
		97.5% Chebyshev(Mean, Sd) UCL	262.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	365.8
95% Approximate Gamma UCL	152.8		
95% Adjusted Gamma UCL	172.5		

Potential UCL to Use	Use 95% Chebyshev (Mean, Sd) UCL	210

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_112	101-07-062	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	10.1	Minimum of Log Data	2.313
Maximum	58.5	Maximum of Log Data	4.069
Mean	24.69	Mean of log Data	3.007
Median	17.2	SD of log Data	0.632
SD	18.47		
Coefficient of Variation	0.748		
Skewness	1.468		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.722	Shapiro Wilk Test Statistic	0.856
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	36.14	95% H-UCL	43.43
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	46.64
95% Adjusted-CLT UCL	38.03	97.5% Chebyshev (MVUE) UCL	56.41
95% Modified-t UCL	36.64	99% Chebyshev (MVUE) UCL	75.59

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.848	Data appear Lognormal at 5% Significance Level	
Theta Star	13.36		
nu star	33.27		
Approximate Chi Square Value (.05)	21.08	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	34.81
Adjusted Chi Square Value	19.06	95% Jackknife UCL	36.14
		95% Standard Bootstrap UCL	34.19
Anderson-Darling Test Statistic	0.842	95% Bootstrap-t UCL	67.55
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	116.2
Kolmogorov-Smirnov Test Statistic	0.286	95% Percentile Bootstrap UCL	34.98
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	38.5
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	51.52
		97.5% Chebyshev(Mean, Sd) UCL	63.13
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	85.94
95% Approximate Gamma UCL	38.96		
95% Adjusted Gamma UCL	43.09		

Potential UCL to Use	Use 95% H-UCL	43.43

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_113	101-07-062	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2930	Minimum of Log Data	7.983
Maximum	13600	Maximum of Log Data	9.518
Mean	6512	Mean of log Data	8.649
Median	4750	SD of log Data	0.531
SD	3780		
Coefficient of Variation	0.58		
Skewness	1.151		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.83	Shapiro Wilk Test Statistic	0.911
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	8855	95% H-UCL	10202
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11505
95% Adjusted-CLT UCL	9101	97.5% Chebyshev (MVUE) UCL	13691
95% Modified-t UCL	8936	99% Chebyshev (MVUE) UCL	17985

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.69	Data appear Normal at 5% Significance Level
Theta Star	2421	
nu star	48.42	
Approximate Chi Square Value (.05)	33.45	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 8585
Adjusted Chi Square Value	30.85	95% Jackknife UCL 8855
		95% Standard Bootstrap UCL 8507
Anderson-Darling Test Statistic	0.562	95% Bootstrap-t UCL 11019
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL 9386
Kolmogorov-Smirnov Test Statistic	0.271	95% Percentile Bootstrap UCL 8550
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 8839
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 12005
		97.5% Chebyshev(Mean, Sd) UCL 14381
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 19049
95% Approximate Gamma UCL	9427	
95% Adjusted Gamma UCL	10223	

Potential UCL to Use		Use 95% Student's-t UCL	8855

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_114	101-07-062	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	70.3	Minimum of Log Data	4.253
Maximum	268	Maximum of Log Data	5.591
Mean	125.8	Mean of log Data	4.703
Median	94.1	SD of log Data	0.509
SD	77.51		
Coefficient of Variation	0.616		
Skewness	1.511		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.692	Shapiro Wilk Test Statistic	0.784
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	173.9	95% H-UCL	190.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	216.4
95% Adjusted-CLT UCL	182.2	97.5% Chebyshev (MVUE) UCL	256.6
95% Modified-t UCL	176.1	99% Chebyshev (MVUE) UCL	335.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.706	Data do not follow a Discernable Distribution (0.05)	
Theta Star	46.5		
nu star	48.72		
Approximate Chi Square Value (.05)	33.69	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	168.3
Adjusted Chi Square Value	31.08	95% Jackknife UCL	173.9
		95% Standard Bootstrap UCL	165
Anderson-Darling Test Statistic	1.096	95% Bootstrap-t UCL	344.2
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	489.5
Kolmogorov-Smirnov Test Statistic	0.342	95% Percentile Bootstrap UCL	167.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	183.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	238.5
		97.5% Chebyshev(Mean, Sd) UCL	287.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	382.9
95% Approximate Gamma UCL	182		
95% Adjusted Gamma UCL	197.3		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	238.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_115	101-07-089K	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	21.7	Minimum of Log Data	3.077
Maximum	157	Maximum of Log Data	5.056
Mean	49.98	Mean of log Data	3.686
Median	33	SD of log Data	0.641
SD	43.88		
Coefficient of Variation	0.878		
Skewness	2.258		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.665	Shapiro Wilk Test Statistic	0.83
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	77.18	95% H-UCL	87.19
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	93.13
95% Adjusted-CLT UCL	85.8	97.5% Chebyshev (MVUE) UCL	112.8
95% Modified-t UCL	79.01	99% Chebyshev (MVUE) UCL	151.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.654	Data appear Lognormal at 5% Significance Level	
Theta Star	30.21		
nu star	29.78		
Approximate Chi Square Value (.05)	18.32	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	74.04
Adjusted Chi Square Value	16.45	95% Jackknife UCL	77.18
		95% Standard Bootstrap UCL	72.95
Anderson-Darling Test Statistic	0.959	95% Bootstrap-t UCL	197.8
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	216.7
Kolmogorov-Smirnov Test Statistic	0.32	95% Percentile Bootstrap UCL	76.37
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	89.53
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	113.7
		97.5% Chebyshev(Mean, Sd) UCL	141.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	195.5
95% Approximate Gamma UCL	81.24		
95% Adjusted Gamma UCL	90.47		

Potential UCL to Use		Use 95% H-UCL	87.19

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_116	101-07-089K	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	6140	Minimum of Log Data	8.723
Maximum	14800	Maximum of Log Data	9.602
Mean	9104	Mean of log Data	9.078
Median	8320	SD of log Data	0.288
SD	2818		
Coefficient of Variation	0.31		
Skewness	1.144		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.892	Shapiro Wilk Test Statistic	0.942
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	10851	95% H-UCL	11210
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	12914
95% Adjusted-CLT UCL	11032	97.5% Chebyshev (MVUE) UCL	14570
95% Modified-t UCL	10911	99% Chebyshev (MVUE) UCL	17821
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	8.821	Data appear Normal at 5% Significance Level	
Theta Star	1032		
nu star	158.8		
Approximate Chi Square Value (.05)	130.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	10650
Adjusted Chi Square Value	125.3	95% Jackknife UCL	10851
		95% Standard Bootstrap UCL	10590
Anderson-Darling Test Statistic	0.353	95% Bootstrap-t UCL	11954
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	12940
Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	10637
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	10944
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13199
		97.5% Chebyshev(Mean, Sd) UCL	14971
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	18452
95% Approximate Gamma UCL	11065		
95% Adjusted Gamma UCL	11540		
Potential UCL to Use		Use 95% Student's-t UCL	10851

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_117	101-07-089K	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	82.2	Minimum of Log Data	4.409
Maximum	1530	Maximum of Log Data	7.333
Mean	314.2	Mean of log Data	5.224
Median	121	SD of log Data	0.931
SD	464.3		
Coefficient of Variation	1.478		
Skewness	2.803		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.548	Shapiro Wilk Test Statistic	0.82
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	602	95% H-UCL	806
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	645.6
95% Adjusted-CLT UCL	723.3	97.5% Chebyshev (MVUE) UCL	808.4
95% Modified-t UCL	626.1	99% Chebyshev (MVUE) UCL	1128

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.798	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	393.7		
nu star	14.37		
Approximate Chi Square Value (.05)	6.823	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	568.8
Adjusted Chi Square Value	5.763	95% Jackknife UCL	602
		95% Standard Bootstrap UCL	557
Anderson-Darling Test Statistic	1.078	95% Bootstrap-t UCL	1768
Anderson-Darling 5% Critical Value	0.742	95% Hall's Bootstrap UCL	1565
Kolmogorov-Smirnov Test Statistic	0.253	95% Percentile Bootstrap UCL	602.3
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL	758.7
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	988.8
		97.5% Chebyshev(Mean, Sd) UCL	1281
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1854
95% Approximate Gamma UCL	661.6		
95% Adjusted Gamma UCL	783.3		

Potential UCL to Use		Use 95% Approximate Gamma UCL	661.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_118	101-07-089Q	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4.7	Minimum of Log Data	1.548
Maximum	58.6	Maximum of Log Data	4.071
Mean	25.32	Mean of log Data	2.943
Median	17.9	SD of log Data	0.83
SD	19.95		
Coefficient of Variation	0.788		
Skewness	1.04		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.842	Shapiro Wilk Test Statistic	0.962
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	37.69	95% H-UCL	63.21
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	57.33
95% Adjusted-CLT UCL	38.73	97.5% Chebyshev (MVUE) UCL	71.08
95% Modified-t UCL	38.07	99% Chebyshev (MVUE) UCL	98.09

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.33	Data appear Normal at 5% Significance Level	
Theta Star	19.04		
nu star	23.94		
Approximate Chi Square Value (.05)	13.81	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	36.26
Adjusted Chi Square Value	12.21	95% Jackknife UCL	37.69
		95% Standard Bootstrap UCL	35.53
Anderson-Darling Test Statistic	0.29	95% Bootstrap-t UCL	47.53
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	50.05
Kolmogorov-Smirnov Test Statistic	0.157	95% Percentile Bootstrap UCL	36.13
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	37.27
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	54.31
		97.5% Chebyshev(Mean, Sd) UCL	66.85
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	91.49
95% Approximate Gamma UCL	43.92		
95% Adjusted Gamma UCL	49.65		

Potential UCL to Use		Use 95% Student's-t UCL	37.69

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_119	101-07-089Q	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3930	Minimum of Log Data	8.276
Maximum	45900	Maximum of Log Data	10.73
Mean	12401	Mean of log Data	9.11
Median	8380	SD of log Data	0.758
SD	13208		
Coefficient of Variation	1.065		
Skewness	2.51		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.647	Shapiro Wilk Test Statistic	0.889
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20588	95% H-UCL	25303
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24707
95% Adjusted-CLT UCL	23578	97.5% Chebyshev (MVUE) UCL	30379
95% Modified-t UCL	21202	99% Chebyshev (MVUE) UCL	41521

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.228	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	10100	
nu star	22.1	
Approximate Chi Square Value (.05)	12.41	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 19643
Adjusted Chi Square Value	10.91	95% Jackknife UCL 20588
		95% Standard Bootstrap UCL 19346
Anderson-Darling Test Statistic	0.746	95% Bootstrap-t UCL 43077
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL 51924
Kolmogorov-Smirnov Test Statistic	0.255	95% Percentile Bootstrap UCL 20529
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL 24983
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 31591
		97.5% Chebyshev(Mean, Sd) UCL 39895
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 56206
95% Approximate Gamma UCL	22078	
95% Adjusted Gamma UCL	25113	

Potential UCL to Use		Use 95% Approximate Gamma UCL	22078

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_120	101-07-089Q	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	24.7	Minimum of Log Data	3.207
Maximum	259	Maximum of Log Data	5.557
Mean	89.19	Mean of log Data	4.195
Median	65.4	SD of log Data	0.802
SD	77.08		
Coefficient of Variation	0.864		
Skewness	1.566		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.824	Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	137	95% H-UCL	206
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	192.7
95% Adjusted-CLT UCL	145.8	97.5% Chebyshev (MVUE) UCL	238.2
95% Modified-t UCL	139.2	99% Chebyshev (MVUE) UCL	327.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.302	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	68.52		
nu star	23.43		
Approximate Chi Square Value (.05)	13.42	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	131.5
Adjusted Chi Square Value	11.85	95% Jackknife UCL	137
		95% Standard Bootstrap UCL	129.5
Anderson-Darling Test Statistic	0.322	95% Bootstrap-t UCL	181.6
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	286.8
Kolmogorov-Smirnov Test Statistic	0.175	95% Percentile Bootstrap UCL	129.7
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	143.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	201.2
		97.5% Chebyshev(Mean, Sd) UCL	249.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	344.8
95% Approximate Gamma UCL	155.8		
95% Adjusted Gamma UCL	176.4		

Potential UCL to Use		Use 95% Approximate Gamma UCL	155.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_121	101-07-089S	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	15.1	Minimum of Log Data	2.715
Maximum	87.9	Maximum of Log Data	4.476
Mean	53.04	Mean of log Data	3.871
Median	57.7	SD of log Data	0.521
SD	21.74		
Coefficient of Variation	0.41		
Skewness	-0.191		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.966	Shapiro Wilk Test Statistic	0.871
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	66.52	95% H-UCL	84.51
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	95.62
95% Adjusted-CLT UCL	64.47	97.5% Chebyshev (MVUE) UCL	113.6
95% Modified-t UCL	66.45	99% Chebyshev (MVUE) UCL	148.9

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.512	Data appear Normal at 5% Significance Level	
Theta Star	15.1		
nu star	63.22		
Approximate Chi Square Value (.05)	45.93	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	64.97
Adjusted Chi Square Value	42.83	95% Jackknife UCL	66.52
		95% Standard Bootstrap UCL	64.06
Anderson-Darling Test Statistic	0.405	95% Bootstrap-t UCL	65.81
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	64.99
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL	64.19
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	63.79
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	84.64
		97.5% Chebyshev(Mean, Sd) UCL	98.31
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	125.2
95% Approximate Gamma UCL	73.01		
95% Adjusted Gamma UCL	78.28		

Potential UCL to Use	Use 95% Student's-t UCL	66.52

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_122	101-07-089S	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3760	Minimum of Log Data	8.232
Maximum	25200	Maximum of Log Data	10.13
Mean	15752	Mean of log Data	9.507
Median	17900	SD of log Data	0.66
SD	7741		
Coefficient of Variation	0.491		
Skewness	-0.441		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.916	Shapiro Wilk Test Statistic	0.856
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	20550	95% H-UCL	30538
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	32220
95% Adjusted-CLT UCL	19591	97.5% Chebyshev (MVUE) UCL	39121
95% Modified-t UCL	20487	99% Chebyshev (MVUE) UCL	52677

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.295	Data appear Normal at 5% Significance Level	
Theta Star	6864		
nu star	41.31		
Approximate Chi Square Value (.05)	27.58	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	19997
Adjusted Chi Square Value	25.23	95% Jackknife UCL	20550
		95% Standard Bootstrap UCL	19695
Anderson-Darling Test Statistic	0.56	95% Bootstrap-t UCL	19844
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	19300
Kolmogorov-Smirnov Test Statistic	0.255	95% Percentile Bootstrap UCL	19598
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	19409
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27000
		97.5% Chebyshev(Mean, Sd) UCL	31866
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	41426
95% Approximate Gamma UCL	23595		
95% Adjusted Gamma UCL	25786		

Potential UCL to Use		Use 95% Student's-t UCL	20550

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_123	101-07-089S	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	47.7	Minimum of Log Data	3.865
Maximum	276	Maximum of Log Data	5.62
Mean	184.1	Mean of log Data	5.108
Median	192	SD of log Data	0.553
SD	73.54		
Coefficient of Variation	0.4		
Skewness	-0.736		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	0.834
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	229.7	95% H-UCL	307.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	343.4
95% Adjusted-CLT UCL	218	97.5% Chebyshev (MVUE) UCL	410.2
95% Modified-t UCL	228.7	99% Chebyshev (MVUE) UCL	541.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.291	Data appear Normal at 5% Significance Level	
Theta Star	55.94		
nu star	59.24		
Approximate Chi Square Value (.05)	42.54	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	224.4
Adjusted Chi Square Value	39.57	95% Jackknife UCL	229.7
		95% Standard Bootstrap UCL	221.8
Anderson-Darling Test Statistic	0.489	95% Bootstrap-t UCL	223.4
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	217.8
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL	220.6
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	217.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	290.9
		97.5% Chebyshev(Mean, Sd) UCL	337.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	428
95% Approximate Gamma UCL	256.3		
95% Adjusted Gamma UCL	275.5		

Potential UCL to Use		Use 95% Student's-t UCL	229.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_124	101-07-089T	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	32.4	Minimum of Log Data	3.478
Maximum	865	Maximum of Log Data	6.763
Mean	148.6	Mean of log Data	4.332
Median	63.6	SD of log Data	0.965
SD	269.3		
Coefficient of Variation	1.812		
Skewness	2.972		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.454	Shapiro Wilk Test Statistic	0.708
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	315.5	95% H-UCL	364.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	278
95% Adjusted-CLT UCL	391.3	97.5% Chebyshev (MVUE) UCL	349.2
95% Modified-t UCL	330.4	99% Chebyshev (MVUE) UCL	489.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.659	Data do not follow a Discernable Distribution (0.05)	
Theta Star	225.7		
nu star	11.85		
Approximate Chi Square Value (.05)	5.131	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	296.3
Adjusted Chi Square Value	4.237	95% Jackknife UCL	315.5
		95% Standard Bootstrap UCL	290.5
Anderson-Darling Test Statistic	1.765	95% Bootstrap-t UCL	2247
Anderson-Darling 5% Critical Value	0.747	95% Hall's Bootstrap UCL	1505
Kolmogorov-Smirnov Test Statistic	0.386	95% Percentile Bootstrap UCL	325.9
Kolmogorov-Smirnov 5% Critical Value	0.288	95% BCA Bootstrap UCL	416.8
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	539.9
		97.5% Chebyshev(Mean, Sd) UCL	709.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1042
95% Approximate Gamma UCL	343.3		
95% Adjusted Gamma UCL	415.8		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	539.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_125	101-07-089T	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5360	Minimum of Log Data	8.587
Maximum	23400	Maximum of Log Data	10.06
Mean	15186	Mean of log Data	9.507
Median	15600	SD of log Data	0.559
SD	6955		
Coefficient of Variation	0.458		
Skewness	-0.322		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.896	Shapiro Wilk Test Statistic	0.859
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	19497	95% H-UCL	25253
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	28162
95% Adjusted-CLT UCL	18733	97.5% Chebyshev (MVUE) UCL	33674
95% Modified-t UCL	19455	99% Chebyshev (MVUE) UCL	44502

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.925	Data appear Normal at 5% Significance Level
Theta Star	5192	
nu star	52.65	
Approximate Chi Square Value (.05)	36.98	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 18999
Adjusted Chi Square Value	34.23	95% Jackknife UCL 19497
		95% Standard Bootstrap UCL 18777
Anderson-Darling Test Statistic	0.569	95% Bootstrap-t UCL 19337
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL 18323
Kolmogorov-Smirnov Test Statistic	0.248	95% Percentile Bootstrap UCL 18613
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 18462
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 25291
		97.5% Chebyshev(Mean, Sd) UCL 29663
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 38252
95% Approximate Gamma UCL	21619	
95% Adjusted Gamma UCL	23356	

Potential UCL to Use	Use 95% Student's-t UCL	19497

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_126	101-07-089T	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	102	Minimum of Log Data	4.625
Maximum	436	Maximum of Log Data	6.078
Mean	198.8	Mean of log Data	5.18
Median	176	SD of log Data	0.489
SD	107.1		
Coefficient of Variation	0.539		
Skewness	1.468		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.851	Shapiro Wilk Test Statistic	0.931
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	265.2	95% H-UCL	297.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	339.7
95% Adjusted-CLT UCL	276.2	97.5% Chebyshev (MVUE) UCL	401.3
95% Modified-t UCL	268.1	99% Chebyshev (MVUE) UCL	522.2

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.153	Data appear Normal at 5% Significance Level	
Theta Star	63.04		
nu star	56.76		
Approximate Chi Square Value (.05)	40.44	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	257.5
Adjusted Chi Square Value	37.56	95% Jackknife UCL	265.2
		95% Standard Bootstrap UCL	254
Anderson-Darling Test Statistic	0.343	95% Bootstrap-t UCL	298.7
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	331.3
Kolmogorov-Smirnov Test Statistic	0.177	95% Percentile Bootstrap UCL	256.2
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	270.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	354.4
		97.5% Chebyshev(Mean, Sd) UCL	421.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	554.1
95% Approximate Gamma UCL	279		
95% Adjusted Gamma UCL	300.4		

Potential UCL to Use		Use 95% Student's-t UCL	265.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_127	101-07-089U	9	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13.8	Minimum of Log Data	2.625
Maximum	59.9	Maximum of Log Data	4.093
Mean	40.84	Mean of log Data	3.63
Median	43.7	SD of log Data	0.46
SD	15.02		
Coefficient of Variation	0.368		
Skewness	-0.469		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Test Statistic	0.87
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	50.16	95% H-UCL	60.37
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	69.43
95% Adjusted-CLT UCL	48.24	97.5% Chebyshev (MVUE) UCL	81.56
95% Modified-t UCL	50.03	99% Chebyshev (MVUE) UCL	105.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.362	Data appear Normal at 5% Significance Level	
Theta Star	9.363		
nu star	78.52		
Approximate Chi Square Value (.05)	59.11	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	49.08
Adjusted Chi Square Value	55.57	95% Jackknife UCL	50.16
		95% Standard Bootstrap UCL	48.52
Anderson-Darling Test Statistic	0.392	95% Bootstrap-t UCL	49.34
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	48.24
Kolmogorov-Smirnov Test Statistic	0.176	95% Percentile Bootstrap UCL	48.51
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	48.17
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	62.67
		97.5% Chebyshev(Mean, Sd) UCL	72.12
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	90.67
95% Approximate Gamma UCL	54.26		
95% Adjusted Gamma UCL	57.72		

Potential UCL to Use		Use 95% Student's-t UCL	50.16

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_128	101-07-089U	9	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3970	Minimum of Log Data	8.287
Maximum	20900	Maximum of Log Data	9.948
Mean	13858	Mean of log Data	9.437
Median	12500	SD of log Data	0.52
SD	5625		
Coefficient of Variation	0.406		
Skewness	-0.324		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	0.869
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17345	95% H-UCL	22043
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24953
95% Adjusted-CLT UCL	16726	97.5% Chebyshev (MVUE) UCL	29638
95% Modified-t UCL	17311	99% Chebyshev (MVUE) UCL	38840

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.536	Data appear Normal at 5% Significance Level	
Theta Star	3919		
nu star	63.65		
Approximate Chi Square Value (.05)	46.29	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	16942
Adjusted Chi Square Value	43.19	95% Jackknife UCL	17345
		95% Standard Bootstrap UCL	16654
Anderson-Darling Test Statistic	0.357	95% Bootstrap-t UCL	17126
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	16543
Kolmogorov-Smirnov Test Statistic	0.153	95% Percentile Bootstrap UCL	16817
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	16594
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	22031
		97.5% Chebyshev(Mean, Sd) UCL	25568
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	32515
95% Approximate Gamma UCL	19052		
95% Adjusted Gamma UCL	20422		

Potential UCL to Use		Use 95% Student's-t UCL	17345

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_129	101-07-089U	9	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	42.9	Minimum of Log Data	3.759
Maximum	236	Maximum of Log Data	5.464
Mean	128.6	Mean of log Data	4.763
Median	125	SD of log Data	0.485
SD	55.61		
Coefficient of Variation	0.433		
Skewness	0.568		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.974	Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	163	95% H-UCL	194.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	222.4
95% Adjusted-CLT UCL	162.8	97.5% Chebyshev (MVUE) UCL	262.5
95% Modified-t UCL	163.6	99% Chebyshev (MVUE) UCL	341.3

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.731	Data appear Normal at 5% Significance Level
Theta Star	34.46	
nu star	67.16	
Approximate Chi Square Value (.05)	49.3	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 159.1
Adjusted Chi Square Value	46.09	95% Jackknife UCL 163
		95% Standard Bootstrap UCL 157.5
Anderson-Darling Test Statistic	0.187	95% Bootstrap-t UCL 170.8
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL 177.9
Kolmogorov-Smirnov Test Statistic	0.129	95% Percentile Bootstrap UCL 158.2
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 158.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 209.4
		97.5% Chebyshev(Mean, Sd) UCL 244.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 313
95% Approximate Gamma UCL	175.1	
95% Adjusted Gamma UCL	187.3	

Potential UCL to Use	Use 95% Student's-t UCL	163

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_130	101-07-008	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	19.7	Minimum of Log Data	2.981
Maximum	113	Maximum of Log Data	4.727
Mean	51.34	Mean of log Data	3.811
Median	46.6	SD of log Data	0.537
SD	28.29		
Coefficient of Variation	0.551		
Skewness	1.31		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Test Statistic	0.985
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	68.88	95% H-UCL	81.75
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	91.97
95% Adjusted-CLT UCL	71.26	97.5% Chebyshev (MVUE) UCL	109.6
95% Modified-t UCL	69.57	99% Chebyshev (MVUE) UCL	144.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.801	Data appear Normal at 5% Significance Level	
Theta Star	18.33		
nu star	50.41		
Approximate Chi Square Value (.05)	35.11	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	66.86
Adjusted Chi Square Value	32.43	95% Jackknife UCL	68.88
		95% Standard Bootstrap UCL	66.25
Anderson-Darling Test Statistic	0.169	95% Bootstrap-t UCL	76.64
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	132.9
Kolmogorov-Smirnov Test Statistic	0.119	95% Percentile Bootstrap UCL	67.46
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	71.04
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	92.45
		97.5% Chebyshev(Mean, Sd) UCL	110.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	145.2
95% Approximate Gamma UCL	73.73		
95% Adjusted Gamma UCL	79.8		

Potential UCL to Use		Use 95% Student's-t UCL	68.88

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_131	101-07-008	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	6410	Minimum of Log Data	8.766
Maximum	20200	Maximum of Log Data	9.913
Mean	11686	Mean of log Data	9.302
Median	12100	SD of log Data	0.382
SD	4443		
Coefficient of Variation	0.38		
Skewness	0.725		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.936	Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	14439	95% H-UCL	15717
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18235
95% Adjusted-CLT UCL	14504	97.5% Chebyshev (MVUE) UCL	21067
95% Modified-t UCL	14499	99% Chebyshev (MVUE) UCL	26629

Gamma Distribution Test		Data Distribution
k star (bias corrected)	5.388	Data appear Normal at 5% Significance Level
Theta Star	2169	
nu star	96.98	
Approximate Chi Square Value (.05)	75.27	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 14121
Adjusted Chi Square Value	71.24	95% Jackknife UCL 14439
		95% Standard Bootstrap UCL 13973
Anderson-Darling Test Statistic	0.243	95% Bootstrap-t UCL 15063
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL 16272
Kolmogorov-Smirnov Test Statistic	0.147	95% Percentile Bootstrap UCL 14023
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 14333
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 18140
		97.5% Chebyshev(Mean, Sd) UCL 20934
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 26420
95% Approximate Gamma UCL	15057	
95% Adjusted Gamma UCL	15908	

Potential UCL to Use	Use 95% Student's-t UCL	14439

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_132	101-07-008	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	140	Minimum of Log Data	4.942
Maximum	810	Maximum of Log Data	6.697
Mean	346.6	Mean of log Data	5.723
Median	285	SD of log Data	0.52
SD	199.2		
Coefficient of Variation	0.575		
Skewness	1.718		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.836	Shapiro Wilk Test Statistic	0.967
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	470	95% H-UCL	537.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	608.6
95% Adjusted-CLT UCL	496.4	97.5% Chebyshev (MVUE) UCL	722.9
95% Modified-t UCL	476.3	99% Chebyshev (MVUE) UCL	947.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.842	Data appear Normal at 5% Significance Level	
Theta Star	121.9		
nu star	51.16		
Approximate Chi Square Value (.05)	35.73	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	455.8
Adjusted Chi Square Value	33.03	95% Jackknife UCL	470
		95% Standard Bootstrap UCL	452
Anderson-Darling Test Statistic	0.304	95% Bootstrap-t UCL	541.4
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	947.5
Kolmogorov-Smirnov Test Statistic	0.171	95% Percentile Bootstrap UCL	460.6
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	487
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	635.9
		97.5% Chebyshev(Mean, Sd) UCL	761.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1007
95% Approximate Gamma UCL	496.2		
95% Adjusted Gamma UCL	536.7		

Potential UCL to Use		Use 95% Student's-t UCL	470

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_133	101-07-010	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	10.2	Minimum of Log Data	2.322
Maximum	51.5	Maximum of Log Data	3.942
Mean	30.2	Mean of log Data	3.294
Median	27.8	SD of log Data	0.533
SD	14.04		
Coefficient of Variation	0.465		
Skewness	0.176		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	38.9	95% H-UCL	48.42
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	54.56
95% Adjusted-CLT UCL	38.19	97.5% Chebyshev (MVUE) UCL	64.95
95% Modified-t UCL	38.95	99% Chebyshev (MVUE) UCL	85.36

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.115	Data appear Normal at 5% Significance Level	
Theta Star	9.696		
nu star	56.06		
Approximate Chi Square Value (.05)	39.86	Nonparametric Statistics	
Adjusted Level of Significance	0.0231	95% CLT UCL	37.9
Adjusted Chi Square Value	36.99	95% Jackknife UCL	38.9
		95% Standard Bootstrap UCL	37.38
Anderson-Darling Test Statistic	0.23	95% Bootstrap-t UCL	39.21
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	37.85
Kolmogorov-Smirnov Test Statistic	0.16	95% Percentile Bootstrap UCL	37.58
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	37.67
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	50.6
		97.5% Chebyshev(Mean, Sd) UCL	59.43
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	76.77
95% Approximate Gamma UCL	42.48		
95% Adjusted Gamma UCL	45.77		

Potential UCL to Use		Use 95% Student's-t UCL	38.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_134	101-07-010	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1960	Minimum of Log Data	7.581
Maximum	15700	Maximum of Log Data	9.661
Mean	8818	Mean of log Data	8.961
Median	8080	SD of log Data	0.595
SD	3923		
Coefficient of Variation	0.445		
Skewness	0.0559		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.97	Shapiro Wilk Test Statistic	0.849
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	11249	95% H-UCL	15615
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	17117
95% Adjusted-CLT UCL	10995	97.5% Chebyshev (MVUE) UCL	20587
95% Modified-t UCL	11253	99% Chebyshev (MVUE) UCL	27403

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.869	Data appear Normal at 5% Significance Level	
Theta Star	3073		
nu star	51.65		
Approximate Chi Square Value (.05)	36.14	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	10969
Adjusted Chi Square Value	33.43	95% Jackknife UCL	11249
		95% Standard Bootstrap UCL	10822
Anderson-Darling Test Statistic	0.424	95% Bootstrap-t UCL	11440
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	11704
Kolmogorov-Smirnov Test Statistic	0.235	95% Percentile Bootstrap UCL	10938
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	10809
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	14518
		97.5% Chebyshev(Mean, Sd) UCL	16984
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	21829
95% Approximate Gamma UCL	12601		
95% Adjusted Gamma UCL	13624		

Potential UCL to Use		Use 95% Student's-t UCL	11249

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_135	101-07-010	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	36.2	Minimum of Log Data	3.589
Maximum	450	Maximum of Log Data	6.109
Mean	202.3	Mean of log Data	5.031
Median	205	SD of log Data	0.861
SD	141		
Coefficient of Variation	0.697		
Skewness	0.555		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.942	Shapiro Wilk Test Statistic	0.941
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	289.7	95% H-UCL	550.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	482.3
95% Adjusted-CLT UCL	288.9	97.5% Chebyshev (MVUE) UCL	599.9
95% Modified-t UCL	291.2	99% Chebyshev (MVUE) UCL	830.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.37	Data appear Normal at 5% Significance Level	
Theta Star	147.7		
nu star	24.65		
Approximate Chi Square Value (.05)	14.34	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	279.6
Adjusted Chi Square Value	12.72	95% Jackknife UCL	289.7
		95% Standard Bootstrap UCL	275.8
Anderson-Darling Test Statistic	0.227	95% Bootstrap-t UCL	308.4
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	301.9
Kolmogorov-Smirnov Test Statistic	0.158	95% Percentile Bootstrap UCL	275.8
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	283.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	407.2
		97.5% Chebyshev(Mean, Sd) UCL	495.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	670
95% Approximate Gamma UCL	347.7		
95% Adjusted Gamma UCL	392.2		
Potential UCL to Use		Use 95% Student's-t UCL	289.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_136	101-07-014	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	10.1	Minimum of Log Data	2.313
Maximum	53.7	Maximum of Log Data	3.983
Mean	25.67	Mean of log Data	3.101
Median	17.8	SD of log Data	0.556
SD	15.42		
Coefficient of Variation	0.601		
Skewness	1.122		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.823	Shapiro Wilk Test Statistic	0.91
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	35.23	95% H-UCL	41.54
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	46.37
95% Adjusted-CLT UCL	36.17	97.5% Chebyshev (MVUE) UCL	55.42
95% Modified-t UCL	35.55	99% Chebyshev (MVUE) UCL	73.21

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.488	Data appear Gamma Distributed at 5% Significance Level
Theta Star	10.32	
nu star	44.78	
Approximate Chi Square Value (.05)	30.43	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 34.12
Adjusted Chi Square Value	27.96	95% Jackknife UCL 35.23
		95% Standard Bootstrap UCL 33.68
Anderson-Darling Test Statistic	0.601	95% Bootstrap-t UCL 44.07
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL 38.1
Kolmogorov-Smirnov Test Statistic	0.255	95% Percentile Bootstrap UCL 33.84
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 35.41
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 48.07
		97.5% Chebyshev(Mean, Sd) UCL 57.77
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 76.81
95% Approximate Gamma UCL	37.77	
95% Adjusted Gamma UCL	41.11	

Potential UCL to Use		Use 95% Approximate Gamma UCL	37.77

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_137	101-07-014	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2650	Minimum of Log Data	7.882
Maximum	13400	Maximum of Log Data	9.503
Mean	8016	Mean of log Data	8.889
Median	7900	SD of log Data	0.504
SD	3485		
Coefficient of Variation	0.435		
Skewness	0.171		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.963	Shapiro Wilk Test Statistic	0.933
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10176	95% H-UCL	12426
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	14135
95% Adjusted-CLT UCL	9997	97.5% Chebyshev (MVUE) UCL	16743
95% Modified-t UCL	10187	99% Chebyshev (MVUE) UCL	21865

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.503	Data appear Normal at 5% Significance Level
Theta Star	2288	
nu star	63.06	
Approximate Chi Square Value (.05)	45.79	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 9926
Adjusted Chi Square Value	42.7	95% Jackknife UCL 10176
		95% Standard Bootstrap UCL 9792
Anderson-Darling Test Statistic	0.245	95% Bootstrap-t UCL 10460
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL 10674
Kolmogorov-Smirnov Test Statistic	0.168	95% Percentile Bootstrap UCL 9883
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 9867
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 13079
		97.5% Chebyshev(Mean, Sd) UCL 15270
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 19574
95% Approximate Gamma UCL	11038	
95% Adjusted Gamma UCL	11836	

Potential UCL to Use		Use 95% Student's-t UCL	10176

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_138	101-07-014	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	82	Minimum of Log Data	4.407
Maximum	705	Maximum of Log Data	6.558
Mean	416.9	Mean of log Data	5.87
Median	379	SD of log Data	0.676
SD	212.8		
Coefficient of Variation	0.51		
Skewness	-0.0517		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.878
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	548.8	95% H-UCL	831.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	867
95% Adjusted-CLT UCL	532.3	97.5% Chebyshev (MVUE) UCL	1055
95% Modified-t UCL	548.6	99% Chebyshev (MVUE) UCL	1425

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.227	Data appear Normal at 5% Significance Level	
Theta Star	187.2		
nu star	40.09		
Approximate Chi Square Value (.05)	26.58	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	533.6
Adjusted Chi Square Value	24.28	95% Jackknife UCL	548.8
		95% Standard Bootstrap UCL	526.2
Anderson-Darling Test Statistic	0.349	95% Bootstrap-t UCL	561
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	528.9
Kolmogorov-Smirnov Test Statistic	0.188	95% Percentile Bootstrap UCL	524.6
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	529.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	726.1
		97.5% Chebyshev(Mean, Sd) UCL	859.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1123
95% Approximate Gamma UCL	628.7		
95% Adjusted Gamma UCL	688.2		

Potential UCL to Use		Use 95% Student's-t UCL	548.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_139	101-07-018	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13.7	Minimum of Log Data	2.617
Maximum	56.4	Maximum of Log Data	4.032
Mean	27.84	Mean of log Data	3.224
Median	21.5	SD of log Data	0.468
SD	14.29		
Coefficient of Variation	0.513		
Skewness	1.252		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.862	Shapiro Wilk Test Statistic	0.948
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	36.7	95% H-UCL	40.67
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	46.7
95% Adjusted-CLT UCL	37.81	97.5% Chebyshev (MVUE) UCL	54.94
95% Modified-t UCL	37.03	99% Chebyshev (MVUE) UCL	71.12

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.419	Data appear Normal at 5% Significance Level	
Theta Star	8.143		
nu star	61.55		
Approximate Chi Square Value (.05)	44.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	35.68
Adjusted Chi Square Value	41.47	95% Jackknife UCL	36.7
		95% Standard Bootstrap UCL	35.33
Anderson-Darling Test Statistic	0.371	95% Bootstrap-t UCL	45.64
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	54.7
Kolmogorov-Smirnov Test Statistic	0.212	95% Percentile Bootstrap UCL	35.36
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	36.29
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	48.61
		97.5% Chebyshev(Mean, Sd) UCL	57.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	75.25
95% Approximate Gamma UCL	38.51		
95% Adjusted Gamma UCL	41.33		

Potential UCL to Use		Use 95% Student's-t UCL	36.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_140	101-07-018	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2760	Minimum of Log Data	7.923
Maximum	11000	Maximum of Log Data	9.306
Mean	6407	Mean of log Data	8.709
Median	6200	SD of log Data	0.367
SD	2202		
Coefficient of Variation	0.344		
Skewness	0.758		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.895	Shapiro Wilk Test Statistic	0.883
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	7772	95% H-UCL	8521
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9887
95% Adjusted-CLT UCL	7812	97.5% Chebyshev (MVUE) UCL	11383
95% Modified-t UCL	7803	99% Chebyshev (MVUE) UCL	14321

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.165	Data appear Normal at 5% Significance Level	
Theta Star	1039		
nu star	111		
Approximate Chi Square Value (.05)	87.66	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	7614
Adjusted Chi Square Value	83.29	95% Jackknife UCL	7772
		95% Standard Bootstrap UCL	7549
Anderson-Darling Test Statistic	0.556	95% Bootstrap-t UCL	8250
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	11038
Kolmogorov-Smirnov Test Statistic	0.233	95% Percentile Bootstrap UCL	7564
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	7653
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9607
		97.5% Chebyshev(Mean, Sd) UCL	10991
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	13711
95% Approximate Gamma UCL	8111		
95% Adjusted Gamma UCL	8536		

Potential UCL to Use		Use 95% Student's-t UCL	7772

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_141	101-07-018	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	173	Minimum of Log Data	5.153
Maximum	1290	Maximum of Log Data	7.162
Mean	531.1	Mean of log Data	5.957
Median	263	SD of log Data	0.826
SD	456.2		
Coefficient of Variation	0.859		
Skewness	0.943		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.761	Shapiro Wilk Test Statistic	0.825
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	813.9	95% H-UCL	1272
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1160
95% Adjusted-CLT UCL	832.3	97.5% Chebyshev (MVUE) UCL	1437
95% Modified-t UCL	821.9	99% Chebyshev (MVUE) UCL	1982

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.221	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	434.9		
nu star	21.98		
Approximate Chi Square Value (.05)	12.33	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	781.2
Adjusted Chi Square Value	10.83	95% Jackknife UCL	813.9
		95% Standard Bootstrap UCL	760.1
Anderson-Darling Test Statistic	0.885	95% Bootstrap-t UCL	924.8
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL	704.3
Kolmogorov-Smirnov Test Statistic	0.267	95% Percentile Bootstrap UCL	770.9
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	794.7
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1194
		97.5% Chebyshev(Mean, Sd) UCL	1481
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2044
95% Approximate Gamma UCL	947.3		
95% Adjusted Gamma UCL	1078		

Potential UCL to Use		Use 95% Approximate Gamma UCL	947.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_142	101-07-027	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13.6	Minimum of Log Data	2.61
Maximum	35.4	Maximum of Log Data	3.567
Mean	23.77	Mean of log Data	3.111
Median	24.5	SD of log Data	0.369
SD	8.134		
Coefficient of Variation	0.342		
Skewness	-0.0289		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.902	Shapiro Wilk Test Statistic	0.871
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	28.81	95% H-UCL	31.63
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	36.71
95% Adjusted-CLT UCL	28.2	97.5% Chebyshev (MVUE) UCL	42.28
95% Modified-t UCL	28.8	99% Chebyshev (MVUE) UCL	53.22

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.986	Data appear Normal at 5% Significance Level	
Theta Star	3.97		
nu star	107.8		
Approximate Chi Square Value (.05)	84.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	28.23
Adjusted Chi Square Value	80.51	95% Jackknife UCL	28.81
		95% Standard Bootstrap UCL	27.92
Anderson-Darling Test Statistic	0.539	95% Bootstrap-t UCL	28.6
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	27.89
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL	27.9
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	27.84
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	35.58
		97.5% Chebyshev(Mean, Sd) UCL	40.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	50.74
95% Approximate Gamma UCL	30.2		
95% Adjusted Gamma UCL	31.81		

Potential UCL to Use		Use 95% Student's-t UCL	28.81

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_143	101-07-027	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3870	Minimum of Log Data	8.261
Maximum	8870	Maximum of Log Data	9.09
Mean	6014	Mean of log Data	8.673
Median	5680	SD of log Data	0.253
SD	1536		
Coefficient of Variation	0.255		
Skewness	0.626		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.965	Shapiro Wilk Test Statistic	0.987
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6967	95% H-UCL	7202
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8235
95% Adjusted-CLT UCL	6971	97.5% Chebyshev (MVUE) UCL	9196
95% Modified-t UCL	6984	99% Chebyshev (MVUE) UCL	11084

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.88	Data appear Normal at 5% Significance Level	
Theta Star	506.4		
nu star	213.8		
Approximate Chi Square Value (.05)	181	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6857
Adjusted Chi Square Value	174.6	95% Jackknife UCL	6967
		95% Standard Bootstrap UCL	6845
Anderson-Darling Test Statistic	0.169	95% Bootstrap-t UCL	7291
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	7669
Kolmogorov-Smirnov Test Statistic	0.127	95% Percentile Bootstrap UCL	6879
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6928
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8246
		97.5% Chebyshev(Mean, Sd) UCL	9212
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	11109
95% Approximate Gamma UCL	7106		
95% Adjusted Gamma UCL	7365		

Potential UCL to Use		Use 95% Student's-t UCL	6967

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_144	101-07-027	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	103	Minimum of Log Data	4.635
Maximum	237	Maximum of Log Data	5.468
Mean	165.9	Mean of log Data	5.082
Median	166	SD of log Data	0.258
SD	41.78		
Coefficient of Variation	0.252		
Skewness	0.293		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.978	Shapiro Wilk Test Statistic	0.98
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	191.8	95% H-UCL	199.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	228.5
95% Adjusted-CLT UCL	190.3	97.5% Chebyshev (MVUE) UCL	255.5
95% Modified-t UCL	192	99% Chebyshev (MVUE) UCL	308.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.69	Data appear Normal at 5% Significance Level	
Theta Star	14.19		
nu star	210.4		
Approximate Chi Square Value (.05)	177.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	188.8
Adjusted Chi Square Value	171.5	95% Jackknife UCL	191.8
		95% Standard Bootstrap UCL	188
Anderson-Darling Test Statistic	0.162	95% Bootstrap-t UCL	195.6
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	201.5
Kolmogorov-Smirnov Test Statistic	0.122	95% Percentile Bootstrap UCL	188.6
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	189.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	226.6
		97.5% Chebyshev(Mean, Sd) UCL	252.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	304.5
95% Approximate Gamma UCL	196.3		
95% Adjusted Gamma UCL	203.5		

Potential UCL to Use		Use 95% Student's-t UCL	191.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_145	101-07-028	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	15.7	Minimum of Log Data	2.754
Maximum	56.5	Maximum of Log Data	4.034
Mean	35.76	Mean of log Data	3.5
Median	29.7	SD of log Data	0.423
SD	14.38		
Coefficient of Variation	0.402		
Skewness	0.345		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Test Statistic	0.93
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	44.67	95% H-UCL	50.24
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	58.12
95% Adjusted-CLT UCL	44.23	97.5% Chebyshev (MVUE) UCL	67.76
95% Modified-t UCL	44.76	99% Chebyshev (MVUE) UCL	86.69

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.551	Data appear Normal at 5% Significance Level	
Theta Star	7.857		
nu star	81.92		
Approximate Chi Square Value (.05)	62.06	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	43.64
Adjusted Chi Square Value	58.43	95% Jackknife UCL	44.67
		95% Standard Bootstrap UCL	43.2
Anderson-Darling Test Statistic	0.38	95% Bootstrap-t UCL	45.65
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	43
Kolmogorov-Smirnov Test Statistic	0.2	95% Percentile Bootstrap UCL	43.37
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	43.79
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	56.65
		97.5% Chebyshev(Mean, Sd) UCL	65.69
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	83.44
95% Approximate Gamma UCL	47.2		
95% Adjusted Gamma UCL	50.13		

Potential UCL to Use		Use 95% Student's-t UCL	44.67

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_146	101-07-028	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3140	Minimum of Log Data	8.052
Maximum	17500	Maximum of Log Data	9.77
Mean	8318	Mean of log Data	8.875
Median	6440	SD of log Data	0.578
SD	5040		
Coefficient of Variation	0.606		
Skewness	1.159		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.828	Shapiro Wilk Test Statistic	0.92
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	11442	95% H-UCL	13888
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15355
95% Adjusted-CLT UCL	11774	97.5% Chebyshev (MVUE) UCL	18418
95% Modified-t UCL	11550	99% Chebyshev (MVUE) UCL	24433

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.386	Data appear Gamma Distributed at 5% Significance Level
Theta Star	3486	
nu star	42.95	
Approximate Chi Square Value (.05)	28.92	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 11081
Adjusted Chi Square Value	26.52	95% Jackknife UCL 11442
		95% Standard Bootstrap UCL 10918
Anderson-Darling Test Statistic	0.502	95% Bootstrap-t UCL 14972
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL 31962
Kolmogorov-Smirnov Test Statistic	0.229	95% Percentile Bootstrap UCL 11037
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 11409
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 15641
		97.5% Chebyshev(Mean, Sd) UCL 18810
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 25034
95% Approximate Gamma UCL	12351	
95% Adjusted Gamma UCL	13472	

Potential UCL to Use		Use 95% Approximate Gamma UCL	12351

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_147	101-07-028	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	86.9	Minimum of Log Data	4.465
Maximum	1180	Maximum of Log Data	7.073
Mean	309.5	Mean of log Data	5.404
Median	189	SD of log Data	0.772
SD	341.3		
Coefficient of Variation	1.103		
Skewness	2.563		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.628	Shapiro Wilk Test Statistic	0.888
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	521.1	95% H-UCL	643.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	620.1
95% Adjusted-CLT UCL	600.5	97.5% Chebyshev (MVUE) UCL	763.8
95% Modified-t UCL	537.3	99% Chebyshev (MVUE) UCL	1046

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.18	Data appear Lognormal at 5% Significance Level	
Theta Star	262.4		
nu star	21.23		
Approximate Chi Square Value (.05)	11.77	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	496.7
Adjusted Chi Square Value	10.31	95% Jackknife UCL	521.1
		95% Standard Bootstrap UCL	480.9
Anderson-Darling Test Statistic	0.841	95% Bootstrap-t UCL	1323
Anderson-Darling 5% Critical Value	0.733	95% Hall's Bootstrap UCL	1569
Kolmogorov-Smirnov Test Statistic	0.297	95% Percentile Bootstrap UCL	513.1
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL	617.7
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	805.5
		97.5% Chebyshev(Mean, Sd) UCL	1020
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1442
95% Approximate Gamma UCL	558.6		
95% Adjusted Gamma UCL	637.5		

Potential UCL to Use		Use 95% H-UCL	643.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_148	101-07-029	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	25.3	Minimum of Log Data	3.231
Maximum	62.1	Maximum of Log Data	4.129
Mean	44.34	Mean of log Data	3.755
Median	46.1	SD of log Data	0.297
SD	12.18		
Coefficient of Variation	0.275		
Skewness	-0.217		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.959	Shapiro Wilk Test Statistic	0.94
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	51.9	95% H-UCL	55.21
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	63.69
95% Adjusted-CLT UCL	50.71	97.5% Chebyshev (MVUE) UCL	72.02
95% Modified-t UCL	51.85	99% Chebyshev (MVUE) UCL	88.39

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	9.177	Data appear Normal at 5% Significance Level	
Theta Star	4.832		
nu star	165.2		
Approximate Chi Square Value (.05)	136.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	51.03
Adjusted Chi Square Value	131	95% Jackknife UCL	51.9
		95% Standard Bootstrap UCL	50.66
Anderson-Darling Test Statistic	0.298	95% Bootstrap-t UCL	51.63
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	50.35
Kolmogorov-Smirnov Test Statistic	0.203	95% Percentile Bootstrap UCL	50.64
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	50.34
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	62.05
		97.5% Chebyshev(Mean, Sd) UCL	69.71
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	84.76
95% Approximate Gamma UCL	53.68		
95% Adjusted Gamma UCL	55.93		

Potential UCL to Use		Use 95% Student's-t UCL	51.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_149	101-07-029	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2880	Minimum of Log Data	7.966
Maximum	17800	Maximum of Log Data	9.787
Mean	9684	Mean of log Data	9.089
Median	10000	SD of log Data	0.487
SD	3911		
Coefficient of Variation	0.404		
Skewness	0.549		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.884	Shapiro Wilk Test Statistic	0.823
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12108	95% H-UCL	14783
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	16897
95% Adjusted-CLT UCL	12083	97.5% Chebyshev (MVUE) UCL	19952
95% Modified-t UCL	12148	99% Chebyshev (MVUE) UCL	25953

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.929	Data appear Normal at 5% Significance Level
Theta Star	2465	
nu star	70.72	
Approximate Chi Square Value (.05)	52.36	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 11829
Adjusted Chi Square Value	49.04	95% Jackknife UCL 12108
		95% Standard Bootstrap UCL 11732
Anderson-Darling Test Statistic	0.697	95% Bootstrap-t UCL 12292
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL 13644
Kolmogorov-Smirnov Test Statistic	0.232	95% Percentile Bootstrap UCL 11714
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 12046
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 15366
		97.5% Chebyshev(Mean, Sd) UCL 17825
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 22654
95% Approximate Gamma UCL	13081	
95% Adjusted Gamma UCL	13965	

Potential UCL to Use	Use 95% Student's-t UCL	12108

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_150	101-07-029	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	74.1	Minimum of Log Data	4.305
Maximum	691	Maximum of Log Data	6.538
Mean	363.3	Mean of log Data	5.734
Median	311	SD of log Data	0.664
SD	193.6		
Coefficient of Variation	0.533		
Skewness	0.402		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.966	Shapiro Wilk Test Statistic	0.915
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	483.4	95% H-UCL	706.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	743.8
95% Adjusted-CLT UCL	478.7	97.5% Chebyshev (MVUE) UCL	903.5
95% Modified-t UCL	484.8	99% Chebyshev (MVUE) UCL	1217

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.242	Data appear Normal at 5% Significance Level	
Theta Star	162.1		
nu star	40.36		
Approximate Chi Square Value (.05)	26.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	469.5
Adjusted Chi Square Value	24.49	95% Jackknife UCL	483.4
		95% Standard Bootstrap UCL	464.3
Anderson-Darling Test Statistic	0.226	95% Bootstrap-t UCL	495.3
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	488.9
Kolmogorov-Smirnov Test Statistic	0.142	95% Percentile Bootstrap UCL	466.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	471.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	644.7
		97.5% Chebyshev(Mean, Sd) UCL	766.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1006
95% Approximate Gamma UCL	547.1		
95% Adjusted Gamma UCL	598.7		

Potential UCL to Use		Use 95% Student's-t UCL	483.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_151	101-07-030	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	8.2	Minimum of Log Data	2.104
Maximum	41.2	Maximum of Log Data	3.718
Mean	24.09	Mean of log Data	3.025
Median	24.9	SD of log Data	0.626
SD	12.85		
Coefficient of Variation	0.533		
Skewness	-0.0255		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.888	Shapiro Wilk Test Statistic	0.881
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	32.05	95% H-UCL	43.75
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	47.14
95% Adjusted-CLT UCL	31.09	97.5% Chebyshev (MVUE) UCL	56.97
95% Modified-t UCL	32.05	99% Chebyshev (MVUE) UCL	76.26
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.302	Data appear Normal at 5% Significance Level	
Theta Star	10.46		
nu star	41.44		
Approximate Chi Square Value (.05)	27.69	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	31.13
Adjusted Chi Square Value	25.34	95% Jackknife UCL	32.05
		95% Standard Bootstrap UCL	30.82
Anderson-Darling Test Statistic	0.516	95% Bootstrap-t UCL	32.19
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	29.95
Kolmogorov-Smirnov Test Statistic	0.236	95% Percentile Bootstrap UCL	30.96
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	31.09
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	42.76
		97.5% Chebyshev(Mean, Sd) UCL	50.84
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	66.7
95% Approximate Gamma UCL	36.06		
95% Adjusted Gamma UCL	39.4		
Potential UCL to Use		Use 95% Student's-t UCL	32.05

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_152	101-07-030	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1560	Minimum of Log Data	7.352
Maximum	18100	Maximum of Log Data	9.804
Mean	9286	Mean of log Data	8.891
Median	9170	SD of log Data	0.821
SD	5843		
Coefficient of Variation	0.629		
Skewness	0.153		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.943	Shapiro Wilk Test Statistic	0.917
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12907	95% H-UCL	23620
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21652
95% Adjusted-CLT UCL	12595	97.5% Chebyshev (MVUE) UCL	26816
95% Modified-t UCL	12924	99% Chebyshev (MVUE) UCL	36960

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.533	Data appear Normal at 5% Significance Level
Theta Star	6056	
nu star	27.6	
Approximate Chi Square Value (.05)	16.62	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 12489
Adjusted Chi Square Value	14.85	95% Jackknife UCL 12907
		95% Standard Bootstrap UCL 12309
Anderson-Darling Test Statistic	0.311	95% Bootstrap-t UCL 13080
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL 12366
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL 12411
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL 12544
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 17775
		97.5% Chebyshev(Mean, Sd) UCL 21448
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 28664
95% Approximate Gamma UCL	15423	
95% Adjusted Gamma UCL	17261	

Potential UCL to Use		Use 95% Student's-t UCL	12907

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_153	101-07-030	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	51	Minimum of Log Data	3.932
Maximum	333	Maximum of Log Data	5.808
Mean	176.8	Mean of log Data	5.002
Median	217	SD of log Data	0.659
SD	98.9		
Coefficient of Variation	0.559		
Skewness	0.119		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.901	Shapiro Wilk Test Statistic	0.89
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	238.1	95% H-UCL	336.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	355.6
95% Adjusted-CLT UCL	232.4	97.5% Chebyshev (MVUE) UCL	431.7
95% Modified-t UCL	238.3	99% Chebyshev (MVUE) UCL	581.1

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.111	Data appear Normal at 5% Significance Level	
Theta Star	83.74		
nu star	38		
Approximate Chi Square Value (.05)	24.88	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	231
Adjusted Chi Square Value	22.67	95% Jackknife UCL	238.1
		95% Standard Bootstrap UCL	229.5
Anderson-Darling Test Statistic	0.576	95% Bootstrap-t UCL	241.4
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	227.1
Kolmogorov-Smirnov Test Statistic	0.268	95% Percentile Bootstrap UCL	228.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	228.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	320.5
		97.5% Chebyshev(Mean, Sd) UCL	382.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	504.8
95% Approximate Gamma UCL	270		
95% Adjusted Gamma UCL	296.3		

Potential UCL to Use		Use 95% Student's-t UCL	238.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_154	101-07-034	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	7

Raw Statistics		Log-transformed Statistics	
Minimum	24.8	Minimum of Log Data	3.211
Maximum	123	Maximum of Log Data	4.812
Mean	37.92	Mean of log Data	3.47
Median	26.6	SD of log Data	0.513
SD	32.02		
Coefficient of Variation	0.844		
Skewness	2.958		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.46	Shapiro Wilk Test Statistic	0.544
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	57.77	95% H-UCL	55.78
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	63.29
95% Adjusted-CLT UCL	66.73	97.5% Chebyshev (MVUE) UCL	75.08
95% Modified-t UCL	59.53	99% Chebyshev (MVUE) UCL	98.24
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.186	Data do not follow a Discernable Distribution (0.05)	
Theta Star	17.35		
nu star	39.35		
Approximate Chi Square Value (.05)	25.98	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	55.48
Adjusted Chi Square Value	23.71	95% Jackknife UCL	57.77
		95% Standard Bootstrap UCL	54.23
Anderson-Darling Test Statistic	2.132	95% Bootstrap-t UCL	306.7
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	157.6
Kolmogorov-Smirnov Test Statistic	0.393	95% Percentile Bootstrap UCL	58.71
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	69.18
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	84.45
		97.5% Chebyshev(Mean, Sd) UCL	104.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	144.1
95% Approximate Gamma UCL	57.44		
95% Adjusted Gamma UCL	62.93		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	84.45

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_155	101-07-034	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5220	Minimum of Log Data	8.56
Maximum	32700	Maximum of Log Data	10.4
Mean	10401	Mean of log Data	9.063
Median	7590	SD of log Data	0.573
SD	8660		
Coefficient of Variation	0.833		
Skewness	2.633		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.619	Shapiro Wilk Test Statistic	0.814
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	15769	95% H-UCL	16612
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18412
95% Adjusted-CLT UCL	17856	97.5% Chebyshev (MVUE) UCL	22065
95% Modified-t UCL	16191	99% Chebyshev (MVUE) UCL	29242

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.968	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	5286	
nu star	35.42	
Approximate Chi Square Value (.05)	22.8	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 15149
Adjusted Chi Square Value	20.69	95% Jackknife UCL 15769
		95% Standard Bootstrap UCL 14855
Anderson-Darling Test Statistic	0.948	95% Bootstrap-t UCL 27073
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL 31410
Kolmogorov-Smirnov Test Statistic	0.265	95% Percentile Bootstrap UCL 15753
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL 17464
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 22984
		97.5% Chebyshev(Mean, Sd) UCL 28429
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 39124
95% Approximate Gamma UCL	16157	
95% Adjusted Gamma UCL	17804	

Potential UCL to Use		Use 95% Approximate Gamma UCL	16157

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_156	101-07-034	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	128	Minimum of Log Data	4.852
Maximum	788	Maximum of Log Data	6.669
Mean	329.9	Mean of log Data	5.574
Median	178	SD of log Data	0.693
SD	244.5		
Coefficient of Variation	0.741		
Skewness	1.123		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.814	Shapiro Wilk Test Statistic	0.877
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	481.5	95% H-UCL	640.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	660
95% Adjusted-CLT UCL	496.6	97.5% Chebyshev (MVUE) UCL	805
95% Modified-t UCL	486.6	99% Chebyshev (MVUE) UCL	1090

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.661	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	198.6	
nu star	29.89	
Approximate Chi Square Value (.05)	18.41	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 464
Adjusted Chi Square Value	16.54	95% Jackknife UCL 481.5
		95% Standard Bootstrap UCL 456.4
Anderson-Darling Test Statistic	0.619	95% Bootstrap-t UCL 579.5
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL 506.6
Kolmogorov-Smirnov Test Statistic	0.293	95% Percentile Bootstrap UCL 467.9
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL 487.3
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 685.2
		97.5% Chebyshev(Mean, Sd) UCL 838.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 1141
95% Approximate Gamma UCL	535.7	
95% Adjusted Gamma UCL	596.4	

Potential UCL to Use		Use 95% Approximate Gamma UCL	535.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_157	101-07-035AE	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5.2	Minimum of Log Data	1.649
Maximum	72.1	Maximum of Log Data	4.278
Mean	34.48	Mean of log Data	3.235
Median	36	SD of log Data	0.911
SD	24.37		
Coefficient of Variation	0.707		
Skewness	0.36		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	49.58	95% H-UCL	104.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	85.95
95% Adjusted-CLT UCL	48.88	97.5% Chebyshev (MVUE) UCL	107.4
95% Modified-t UCL	49.74	99% Chebyshev (MVUE) UCL	149.6
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.265	Data appear Normal at 5% Significance Level	
Theta Star	27.26		
nu star	22.77		
Approximate Chi Square Value (.05)	12.92	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	47.84
Adjusted Chi Square Value	11.38	95% Jackknife UCL	49.58
		95% Standard Bootstrap UCL	46.78
Anderson-Darling Test Statistic	0.296	95% Bootstrap-t UCL	51.27
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL	47.8
Kolmogorov-Smirnov Test Statistic	0.177	95% Percentile Bootstrap UCL	47.36
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	47.94
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	69.88
		97.5% Chebyshev(Mean, Sd) UCL	85.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	115.3
95% Approximate Gamma UCL	60.78		
95% Adjusted Gamma UCL	68.97		
Potential UCL to Use		Use 95% Student's-t UCL	49.58

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_158	101-07-035AE	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1710	Minimum of Log Data	7.444
Maximum	17500	Maximum of Log Data	9.77
Mean	8307	Mean of log Data	8.727
Median	6310	SD of log Data	0.875
SD	6064		
Coefficient of Variation	0.73		
Skewness	0.525		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.886	Shapiro Wilk Test Statistic	0.906
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12066	95% H-UCL	22981
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	19802
95% Adjusted-CLT UCL	12009	97.5% Chebyshev (MVUE) UCL	24664
95% Modified-t UCL	12124	99% Chebyshev (MVUE) UCL	34213

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.291	Data appear Normal at 5% Significance Level
Theta Star	6435	
nu star	23.24	
Approximate Chi Square Value (.05)	13.27	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 11632
Adjusted Chi Square Value	11.71	95% Jackknife UCL 12066
		95% Standard Bootstrap UCL 11424
Anderson-Darling Test Statistic	0.384	95% Bootstrap-t UCL 12701
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL 12213
Kolmogorov-Smirnov Test Statistic	0.199	95% Percentile Bootstrap UCL 11364
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL 11737
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 17118
		97.5% Chebyshev(Mean, Sd) UCL 20930
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 28419
95% Approximate Gamma UCL	14546	
95% Adjusted Gamma UCL	16481	

Potential UCL to Use	Use 95% Student's-t UCL	12066

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_159	101-07-035AE	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	25.8	Minimum of Log Data	3.25
Maximum	376	Maximum of Log Data	5.93
Mean	138.6	Mean of log Data	4.547
Median	129	SD of log Data	0.975
SD	120.9		
Coefficient of Variation	0.872		
Skewness	1.072		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.872	Shapiro Wilk Test Statistic	0.93
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	213.6	95% H-UCL	463.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	349
95% Adjusted-CLT UCL	220.3	97.5% Chebyshev (MVUE) UCL	438.8
95% Modified-t UCL	216	99% Chebyshev (MVUE) UCL	615.2

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.036	Data appear Normal at 5% Significance Level	
Theta Star	133.8		
nu star	18.64		
Approximate Chi Square Value (.05)	9.858	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	204.9
Adjusted Chi Square Value	8.544	95% Jackknife UCL	213.6
		95% Standard Bootstrap UCL	201.7
Anderson-Darling Test Statistic	0.323	95% Bootstrap-t UCL	253.3
Anderson-Darling 5% Critical Value	0.735	95% Hall's Bootstrap UCL	278.4
Kolmogorov-Smirnov Test Statistic	0.178	95% Percentile Bootstrap UCL	202.9
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL	213.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	314.3
		97.5% Chebyshev(Mean, Sd) UCL	390.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	539.7
95% Approximate Gamma UCL	262.2		
95% Adjusted Gamma UCL	302.5		

Potential UCL to Use		Use 95% Student's-t UCL	213.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_160	101-07-035AS	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	11.7	Minimum of Log Data	2.46
Maximum	30	Maximum of Log Data	3.401
Mean	24.56	Mean of log Data	3.171
Median	25	SD of log Data	0.282
SD	5.416		
Coefficient of Variation	0.221		
Skewness	-1.812		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.799	Shapiro Wilk Test Statistic	0.695
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	27.91	95% H-UCL	30.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	34.87
95% Adjusted-CLT UCL	26.36	97.5% Chebyshev (MVUE) UCL	39.28
95% Modified-t UCL	27.73	99% Chebyshev (MVUE) UCL	47.93
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	11.34	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2.165		
nu star	204.1		
Approximate Chi Square Value (.05)	172.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	27.53
Adjusted Chi Square Value	165.9	95% Jackknife UCL	27.91
		95% Standard Bootstrap UCL	27.4
Anderson-Darling Test Statistic	1.042	95% Bootstrap-t UCL	27.11
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	26.8
Kolmogorov-Smirnov Test Statistic	0.316	95% Percentile Bootstrap UCL	27.06
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	26.73
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	32.42
		97.5% Chebyshev(Mean, Sd) UCL	35.83
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	42.52
95% Approximate Gamma UCL	29.13		
95% Adjusted Gamma UCL	30.22		

Potential UCL to Use		
	Use 95% Student's-t UCL	27.91
	or 95% Modified-t UCL	27.73

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_161	101-07-035AS	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4260	Minimum of Log Data	8.357
Maximum	42100	Maximum of Log Data	10.65
Mean	17334	Mean of log Data	9.526
Median	15400	SD of log Data	0.74
SD	12586		
Coefficient of Variation	0.726		
Skewness	1.149		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.881	Shapiro Wilk Test Statistic	0.977
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	25136	95% H-UCL	36851
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	36561
95% Adjusted-CLT UCL	25952	97.5% Chebyshev (MVUE) UCL	44858
95% Modified-t UCL	25403	99% Chebyshev (MVUE) UCL	61155

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.597	Data appear Normal at 5% Significance Level
Theta Star	10854	
nu star	28.75	
Approximate Chi Square Value (.05)	17.51	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL: 24235
Adjusted Chi Square Value	15.69	95% Jackknife UCL: 25136
		95% Standard Bootstrap UCL: 23740
Anderson-Darling Test Statistic	0.228	95% Bootstrap-t UCL: 30003
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL: 62341
Kolmogorov-Smirnov Test Statistic	0.166	95% Percentile Bootstrap UCL: 24089
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL: 24973
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL: 35621
		97.5% Chebyshev(Mean, Sd) UCL: 43533
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL: 59076
95% Approximate Gamma UCL	28458	
95% Adjusted Gamma UCL	31763	

Potential UCL to Use	Use 95% Student's-t UCL	25136

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_162	101-07-035AS	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	46.4	Minimum of Log Data	3.837
Maximum	285	Maximum of Log Data	5.652
Mean	153.4	Mean of log Data	4.893
Median	146	SD of log Data	0.584
SD	81.86		
Coefficient of Variation	0.534		
Skewness	0.589		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.934	Shapiro Wilk Test Statistic	0.966
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	204.1	95% H-UCL	261.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	288.7
95% Adjusted-CLT UCL	204	97.5% Chebyshev (MVUE) UCL	346.6
95% Modified-t UCL	205	99% Chebyshev (MVUE) UCL	460.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.561	Data appear Normal at 5% Significance Level	
Theta Star	59.88		
nu star	46.1		
Approximate Chi Square Value (.05)	31.52	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	198.3
Adjusted Chi Square Value	29	95% Jackknife UCL	204.1
		95% Standard Bootstrap UCL	195.7
Anderson-Darling Test Statistic	0.176	95% Bootstrap-t UCL	216.8
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	227.3
Kolmogorov-Smirnov Test Statistic	0.137	95% Percentile Bootstrap UCL	197.2
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	204.5
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	272.3
		97.5% Chebyshev(Mean, Sd) UCL	323.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	424.9
95% Approximate Gamma UCL	224.3		
95% Adjusted Gamma UCL	243.8		

Potential UCL to Use		Use 95% Student's-t UCL	204.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_163	101-07-041	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	8.4	Minimum of Log Data	2.128
Maximum	23.1	Maximum of Log Data	3.14
Mean	14.58	Mean of log Data	2.628
Median	14.6	SD of log Data	0.344
SD	4.872		
Coefficient of Variation	0.334		
Skewness	0.334		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.948	Shapiro Wilk Test Statistic	0.946
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	17.6	95% H-UCL	18.93
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21.95
95% Adjusted-CLT UCL	17.44	97.5% Chebyshev (MVUE) UCL	25.13
95% Modified-t UCL	17.63	99% Chebyshev (MVUE) UCL	31.38
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.657	Data appear Normal at 5% Significance Level	
Theta Star	2.19		
nu star	119.8		
Approximate Chi Square Value (.05)	95.55	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	17.25
Adjusted Chi Square Value	90.99	95% Jackknife UCL	17.6
		95% Standard Bootstrap UCL	17.06
Anderson-Darling Test Statistic	0.286	95% Bootstrap-t UCL	17.79
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	17.38
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL	17.09
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	17.17
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	21.66
		97.5% Chebyshev(Mean, Sd) UCL	24.72
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	30.74
95% Approximate Gamma UCL	18.28		
95% Adjusted Gamma UCL	19.2		
Potential UCL to Use		Use 95% Student's-t UCL	17.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_164	101-07-041	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2140	Minimum of Log Data	7.669
Maximum	5870	Maximum of Log Data	8.678
Mean	3336	Mean of log Data	8.063
Median	3210	SD of log Data	0.325
SD	1182		
Coefficient of Variation	0.354		
Skewness	1.315		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.882	Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4068	95% H-UCL	4239
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4908
95% Adjusted-CLT UCL	4168	97.5% Chebyshev (MVUE) UCL	5592
95% Modified-t UCL	4097	99% Chebyshev (MVUE) UCL	6936

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.921	Data appear Normal at 5% Significance Level	
Theta Star	481.9		
nu star	124.6		
Approximate Chi Square Value (.05)	99.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	3984
Adjusted Chi Square Value	95.13	95% Jackknife UCL	4068
		95% Standard Bootstrap UCL	3964
Anderson-Darling Test Statistic	0.323	95% Bootstrap-t UCL	4521
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	6987
Kolmogorov-Smirnov Test Statistic	0.204	95% Percentile Bootstrap UCL	3999
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	4120
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5053
		97.5% Chebyshev(Mean, Sd) UCL	5797
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7257
95% Approximate Gamma UCL	4164		
95% Adjusted Gamma UCL	4368		

Potential UCL to Use		Use 95% Student's-t UCL	4068

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_165	101-07-041	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	104	Minimum of Log Data	4.644
Maximum	294	Maximum of Log Data	5.684
Mean	183.9	Mean of log Data	5.172
Median	174	SD of log Data	0.311
SD	56.16		
Coefficient of Variation	0.305		
Skewness	0.587		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Test Statistic	0.971
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	218.7	95% H-UCL	231.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	267.6
95% Adjusted-CLT UCL	218.6	97.5% Chebyshev (MVUE) UCL	303.8
95% Modified-t UCL	219.3	99% Chebyshev (MVUE) UCL	374.9

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.113	Data appear Normal at 5% Significance Level	
Theta Star	22.67		
nu star	146		
Approximate Chi Square Value (.05)	119.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	214.7
Adjusted Chi Square Value	114	95% Jackknife UCL	218.7
		95% Standard Bootstrap UCL	212.5
Anderson-Darling Test Statistic	0.216	95% Bootstrap-t UCL	223.7
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	229.1
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	214.1
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	217.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	265.5
		97.5% Chebyshev(Mean, Sd) UCL	300.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	370.1
95% Approximate Gamma UCL	225.5		
95% Adjusted Gamma UCL	235.6		

Potential UCL to Use		Use 95% Student's-t UCL	218.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_166	101-07-042	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	5.3	Minimum of Log Data	1.668
Maximum	25	Maximum of Log Data	3.219
Mean	15.28	Mean of log Data	2.568
Median	18.8	SD of log Data	0.645
SD	7.737		
Coefficient of Variation	0.506		
Skewness	-0.388		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.869	Shapiro Wilk Test Statistic	0.805
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	20.07	95% H-UCL	28.72
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	30.61
95% Adjusted-CLT UCL	19.16	97.5% Chebyshev (MVUE) UCL	37.08
95% Modified-t UCL	20.02	99% Chebyshev (MVUE) UCL	49.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.289	Data appear Normal at 5% Significance Level	
Theta Star	6.674		
nu star	41.2		
Approximate Chi Square Value (.05)	27.49	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	19.52
Adjusted Chi Square Value	25.15	95% Jackknife UCL	20.07
		95% Standard Bootstrap UCL	19.32
Anderson-Darling Test Statistic	0.784	95% Bootstrap-t UCL	19.62
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	18.73
Kolmogorov-Smirnov Test Statistic	0.272	95% Percentile Bootstrap UCL	19.27
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	19.13
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.52
		97.5% Chebyshev(Mean, Sd) UCL	31.38
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	40.94
95% Approximate Gamma UCL	22.9		
95% Adjusted Gamma UCL	25.03		
Potential UCL to Use		Use 95% Student's-t UCL	20.07

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_167	101-07-042	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1380	Minimum of Log Data	7.23
Maximum	6540	Maximum of Log Data	8.786
Mean	3748	Mean of log Data	8.108
Median	4000	SD of log Data	0.55
SD	1773		
Coefficient of Variation	0.473		
Skewness	0.0669		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.943	Shapiro Wilk Test Statistic	0.906
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4847	95% H-UCL	6146
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6878
95% Adjusted-CLT UCL	4734	97.5% Chebyshev (MVUE) UCL	8213
95% Modified-t UCL	4849	99% Chebyshev (MVUE) UCL	10835

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.94	Data appear Normal at 5% Significance Level	
Theta Star	1275		
nu star	52.92		
Approximate Chi Square Value (.05)	37.21	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4720
Adjusted Chi Square Value	34.45	95% Jackknife UCL	4847
		95% Standard Bootstrap UCL	4654
Anderson-Darling Test Statistic	0.399	95% Bootstrap-t UCL	4840
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	4760
Kolmogorov-Smirnov Test Statistic	0.233	95% Percentile Bootstrap UCL	4641
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	4672
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6324
		97.5% Chebyshev(Mean, Sd) UCL	7438
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9628
95% Approximate Gamma UCL	5330		
95% Adjusted Gamma UCL	5757		

Potential UCL to Use		Use 95% Student's-t UCL	4847

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_168	101-07-042	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	75.6	Minimum of Log Data	4.325
Maximum	399	Maximum of Log Data	5.989
Mean	225.2	Mean of log Data	5.242
Median	218	SD of log Data	0.666
SD	125.8		
Coefficient of Variation	0.559		
Skewness	0.0668		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.908	Shapiro Wilk Test Statistic	0.872
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	303.1	95% H-UCL	434.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	456.2
95% Adjusted-CLT UCL	295.1	97.5% Chebyshev (MVUE) UCL	554.3
95% Modified-t UCL	303.3	99% Chebyshev (MVUE) UCL	747.1
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.082	Data appear Normal at 5% Significance Level	
Theta Star	108.1		
nu star	37.48		
Approximate Chi Square Value (.05)	24.46	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	294.1
Adjusted Chi Square Value	22.27	95% Jackknife UCL	303.1
		95% Standard Bootstrap UCL	290
Anderson-Darling Test Statistic	0.467	95% Bootstrap-t UCL	305.5
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	284.9
Kolmogorov-Smirnov Test Statistic	0.21	95% Percentile Bootstrap UCL	291.2
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	293.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	407.9
		97.5% Chebyshev(Mean, Sd) UCL	487
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	642.3
95% Approximate Gamma UCL	345		
95% Adjusted Gamma UCL	379		
Potential UCL to Use		Use 95% Student's-t UCL	303.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_169	101-07-046	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3.2	Minimum of Log Data	1.163
Maximum	35.3	Maximum of Log Data	3.564
Mean	14.13	Mean of log Data	2.432
Median	10.9	SD of log Data	0.715
SD	9.952		
Coefficient of Variation	0.704		
Skewness	1.335		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.887	Shapiro Wilk Test Statistic	0.987
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	20.3	95% H-UCL	29
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29.37
95% Adjusted-CLT UCL	21.17	97.5% Chebyshev (MVUE) UCL	35.92
95% Modified-t UCL	20.55	99% Chebyshev (MVUE) UCL	48.8
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.718	Data appear Normal at 5% Significance Level	
Theta Star	8.227		
nu star	30.92		
Approximate Chi Square Value (.05)	19.22	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	19.59
Adjusted Chi Square Value	17.3	95% Jackknife UCL	20.3
		95% Standard Bootstrap UCL	19.36
Anderson-Darling Test Statistic	0.185	95% Bootstrap-t UCL	24.94
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	49.6
Kolmogorov-Smirnov Test Statistic	0.161	95% Percentile Bootstrap UCL	19.83
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	20.63
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	28.59
		97.5% Chebyshev(Mean, Sd) UCL	34.85
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	47.14
95% Approximate Gamma UCL	22.74		
95% Adjusted Gamma UCL	25.26		
Potential UCL to Use		Use 95% Student's-t UCL	20.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_170	101-07-046	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1010	Minimum of Log Data	6.918
Maximum	6240	Maximum of Log Data	8.739
Mean	3140	Mean of log Data	7.876
Median	2680	SD of log Data	0.643
SD	1919		
Coefficient of Variation	0.611		
Skewness	0.677		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4329	95% H-UCL	5782
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6167
95% Adjusted-CLT UCL	4346	97.5% Chebyshev (MVUE) UCL	7470
95% Modified-t UCL	4353	99% Chebyshev (MVUE) UCL	10030

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.071	Data appear Normal at 5% Significance Level	
Theta Star	1516		
nu star	37.27		
Approximate Chi Square Value (.05)	24.29	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4192
Adjusted Chi Square Value	22.11	95% Jackknife UCL	4329
		95% Standard Bootstrap UCL	4125
Anderson-Darling Test Statistic	0.312	95% Bootstrap-t UCL	4589
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	4297
Kolmogorov-Smirnov Test Statistic	0.169	95% Percentile Bootstrap UCL	4207
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	4253
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5928
		97.5% Chebyshev(Mean, Sd) UCL	7134
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9504
95% Approximate Gamma UCL	4817		
95% Adjusted Gamma UCL	5293		

Potential UCL to Use		Use 95% Student's-t UCL	4329

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_171	101-07-046	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	112	Minimum of Log Data	4.718
Maximum	1270	Maximum of Log Data	7.147
Mean	492.1	Mean of log Data	5.934
Median	317	SD of log Data	0.774
SD	389.8		
Coefficient of Variation	0.792		
Skewness	1.29		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.849	Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	733.7	95% H-UCL	1098
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1056
95% Adjusted-CLT UCL	765.5	97.5% Chebyshev (MVUE) UCL	1301
95% Modified-t UCL	743	99% Chebyshev (MVUE) UCL	1782

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.434	Data appear Normal at 5% Significance Level	
Theta Star	343.2		
nu star	25.81		
Approximate Chi Square Value (.05)	15.24	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	705.8
Adjusted Chi Square Value	13.55	95% Jackknife UCL	733.7
		95% Standard Bootstrap UCL	696.7
Anderson-Darling Test Statistic	0.283	95% Bootstrap-t UCL	1019
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	1848
Kolmogorov-Smirnov Test Statistic	0.19	95% Percentile Bootstrap UCL	708.6
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	751.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1058
		97.5% Chebyshev(Mean, Sd) UCL	1304
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1785
95% Approximate Gamma UCL	833.8		
95% Adjusted Gamma UCL	937.4		

Potential UCL to Use		Use 95% Student's-t UCL	733.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_172	101-07-047	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	12.4	Minimum of Log Data	2.518
Maximum	69.3	Maximum of Log Data	4.238
Mean	31.6	Mean of log Data	3.333
Median	24.9	SD of log Data	0.515
SD	17.27		
Coefficient of Variation	0.547		
Skewness	1.377		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.883	Shapiro Wilk Test Statistic	0.981
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	42.31	95% H-UCL	48.85
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	55.39
95% Adjusted-CLT UCL	43.89	97.5% Chebyshev (MVUE) UCL	65.73
95% Modified-t UCL	42.75	99% Chebyshev (MVUE) UCL	86.05

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.953	Data appear Normal at 5% Significance Level	
Theta Star	10.7		
nu star	53.15		
Approximate Chi Square Value (.05)	37.41	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	41.07
Adjusted Chi Square Value	34.64	95% Jackknife UCL	42.31
		95% Standard Bootstrap UCL	40.73
Anderson-Darling Test Statistic	0.249	95% Bootstrap-t UCL	47.65
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	53.43
Kolmogorov-Smirnov Test Statistic	0.178	95% Percentile Bootstrap UCL	41.23
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	43.04
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	56.7
		97.5% Chebyshev(Mean, Sd) UCL	67.56
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	88.89
95% Approximate Gamma UCL	44.9		
95% Adjusted Gamma UCL	48.49		

Potential UCL to Use		Use 95% Student's-t UCL	42.31

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_173	101-07-047	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4600	Minimum of Log Data	8.434
Maximum	16100	Maximum of Log Data	9.687
Mean	8293	Mean of log Data	8.954
Median	6920	SD of log Data	0.384
SD	3506		
Coefficient of Variation	0.423		
Skewness	1.457		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.861	Shapiro Wilk Test Statistic	0.95
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10467	95% H-UCL	11131
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	12913
95% Adjusted-CLT UCL	10823	97.5% Chebyshev (MVUE) UCL	14927
95% Modified-t UCL	10561	99% Chebyshev (MVUE) UCL	18882

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.997	Data appear Normal at 5% Significance Level	
Theta Star	1660		
nu star	89.95		
Approximate Chi Square Value (.05)	69.09	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	10216
Adjusted Chi Square Value	65.24	95% Jackknife UCL	10467
		95% Standard Bootstrap UCL	10057
Anderson-Darling Test Statistic	0.352	95% Bootstrap-t UCL	11546
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	12818
Kolmogorov-Smirnov Test Statistic	0.193	95% Percentile Bootstrap UCL	10232
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	10754
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	13388
		97.5% Chebyshev(Mean, Sd) UCL	15592
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	19923
95% Approximate Gamma UCL	10798		
95% Adjusted Gamma UCL	11435		

Potential UCL to Use		Use 95% Student's-t UCL	10467

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_174	101-07-047	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	152	Minimum of Log Data	5.024
Maximum	915	Maximum of Log Data	6.819
Mean	495.1	Mean of log Data	6.034
Median	351	SD of log Data	0.627
SD	302.8		
Coefficient of Variation	0.612		
Skewness	0.677		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.807	Shapiro Wilk Test Statistic	0.893
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	682.8	95% H-UCL	888.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	956.6
95% Adjusted-CLT UCL	685.5	97.5% Chebyshev (MVUE) UCL	1156
95% Modified-t UCL	686.6	99% Chebyshev (MVUE) UCL	1548

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.129	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	232.6		
nu star	38.32		
Approximate Chi Square Value (.05)	25.14	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	661.1
Adjusted Chi Square Value	22.92	95% Jackknife UCL	682.8
		95% Standard Bootstrap UCL	652.6
Anderson-Darling Test Statistic	0.652	95% Bootstrap-t UCL	705.9
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	619.9
Kolmogorov-Smirnov Test Statistic	0.261	95% Percentile Bootstrap UCL	652
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	666.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	935
		97.5% Chebyshev(Mean, Sd) UCL	1125
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1499
95% Approximate Gamma UCL	754.6		
95% Adjusted Gamma UCL	827.9		

Potential UCL to Use		Use 95% Approximate Gamma UCL	754.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_175	101-07-050A	10	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	7.3	Minimum of Log Data	1.988
Maximum	22.1	Maximum of Log Data	3.096
Mean	12.69	Mean of log Data	2.454
Median	10	SD of log Data	0.437
SD	5.752		
Coefficient of Variation	0.453		
Skewness	0.729		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.849	Shapiro Wilk Test Statistic	0.873
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	16.25	95% H-UCL	17.99
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	20.77
95% Adjusted-CLT UCL	16.34	97.5% Chebyshev (MVUE) UCL	24.28
95% Modified-t UCL	16.33	99% Chebyshev (MVUE) UCL	31.19

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.005	Data appear Normal at 5% Significance Level	
Theta Star	3.168		
nu star	72.09		
Approximate Chi Square Value (.05)	53.54	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	15.84
Adjusted Chi Square Value	50.18	95% Jackknife UCL	16.25
		95% Standard Bootstrap UCL	15.71
Anderson-Darling Test Statistic	0.586	95% Bootstrap-t UCL	17.3
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	15.67
Kolmogorov-Smirnov Test Statistic	0.238	95% Percentile Bootstrap UCL	15.83
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	16.08
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	21.05
		97.5% Chebyshev(Mean, Sd) UCL	24.66
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	31.76
95% Approximate Gamma UCL	17.09		
95% Adjusted Gamma UCL	18.23		

Potential UCL to Use	Use 95% Student's-t UCL	16.25

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_176	101-07-050A	10	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2650	Minimum of Log Data	7.882
Maximum	4970	Maximum of Log Data	8.511
Mean	3791	Mean of log Data	8.223
Median	3650	SD of log Data	0.198
SD	757.1		
Coefficient of Variation	0.2		
Skewness	0.55		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Test Statistic	0.931
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4260	95% H-UCL	4344
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4883
95% Adjusted-CLT UCL	4256	97.5% Chebyshev (MVUE) UCL	5356
95% Modified-t UCL	4268	99% Chebyshev (MVUE) UCL	6284

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	19.3	Data appear Normal at 5% Significance Level	
Theta Star	196.4		
nu star	347.4		
Approximate Chi Square Value (.05)	305.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4206
Adjusted Chi Square Value	296.8	95% Jackknife UCL	4260
		95% Standard Bootstrap UCL	4189
Anderson-Darling Test Statistic	0.407	95% Bootstrap-t UCL	4458
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	4911
Kolmogorov-Smirnov Test Statistic	0.205	95% Percentile Bootstrap UCL	4188
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	4219
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4891
		97.5% Chebyshev(Mean, Sd) UCL	5367
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6302
95% Approximate Gamma UCL	4315		
95% Adjusted Gamma UCL	4437		

Potential UCL to Use		Use 95% Student's-t UCL	4260

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_177	101-07-050A	10	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	72.2	Minimum of Log Data	4.279
Maximum	200	Maximum of Log Data	5.298
Mean	109.3	Mean of log Data	4.626
Median	90.4	SD of log Data	0.378
SD	45.72		
Coefficient of Variation	0.418		
Skewness	1.198		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.812	Shapiro Wilk Test Statistic	0.851
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	137.6	95% H-UCL	145.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	169
95% Adjusted-CLT UCL	140.9	97.5% Chebyshev (MVUE) UCL	195
95% Modified-t UCL	138.7	99% Chebyshev (MVUE) UCL	246.2

Gamma Distribution Test		Data Distribution
k star (bias corrected)	5.09	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	21.47	
nu star	91.63	
Approximate Chi Square Value (.05)	70.55	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 134.4
Adjusted Chi Square Value	66.66	95% Jackknife UCL 137.6
		95% Standard Bootstrap UCL 132.4
Anderson-Darling Test Statistic	0.712	95% Bootstrap-t UCL 151.9
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL 133.2
Kolmogorov-Smirnov Test Statistic	0.28	95% Percentile Bootstrap UCL 133.2
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 138.1
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 175.7
		97.5% Chebyshev(Mean, Sd) UCL 204.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 260.9
95% Approximate Gamma UCL	141.9	
95% Adjusted Gamma UCL	150.2	

Potential UCL to Use		Use 95% Approximate Gamma UCL	141.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_178	101-07-065	11	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4.9	Minimum of Log Data	1.589
Maximum	18.7	Maximum of Log Data	2.929
Mean	11.9	Mean of log Data	2.37
Median	12	SD of log Data	0.504
SD	5.495		
Coefficient of Variation	0.462		
Skewness	0.183		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.885	Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	15.31	95% H-UCL	18.34
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	20.86
95% Adjusted-CLT UCL	15.03	97.5% Chebyshev (MVUE) UCL	24.71
95% Modified-t UCL	15.33	99% Chebyshev (MVUE) UCL	32.27
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.317	Data appear Normal at 5% Significance Level	
Theta Star	3.587		
nu star	59.71		
Approximate Chi Square Value (.05)	42.94	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	14.91
Adjusted Chi Square Value	39.96	95% Jackknife UCL	15.31
		95% Standard Bootstrap UCL	14.78
Anderson-Darling Test Statistic	0.398	95% Bootstrap-t UCL	15.64
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	14.47
Kolmogorov-Smirnov Test Statistic	0.206	95% Percentile Bootstrap UCL	14.8
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	14.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	19.88
		97.5% Chebyshev(Mean, Sd) UCL	23.34
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	30.13
95% Approximate Gamma UCL	16.55		
95% Adjusted Gamma UCL	17.78		
Potential UCL to Use		Use 95% Student's-t UCL	15.31

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_179	101-07-065	11	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	465	Minimum of Log Data	6.142
Maximum	3910	Maximum of Log Data	8.271
Mean	1878	Mean of log Data	7.354
Median	1890	SD of log Data	0.69
SD	1096		
Coefficient of Variation	0.584		
Skewness	0.618		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.954	Shapiro Wilk Test Statistic	0.938
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2557	95% H-UCL	3770
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3895
95% Adjusted-CLT UCL	2559	97.5% Chebyshev (MVUE) UCL	4749
95% Modified-t UCL	2570	99% Chebyshev (MVUE) UCL	6425

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.996	Data appear Normal at 5% Significance Level	
Theta Star	940.5		
nu star	35.94		
Approximate Chi Square Value (.05)	23.22	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2479
Adjusted Chi Square Value	21.09	95% Jackknife UCL	2557
		95% Standard Bootstrap UCL	2461
Anderson-Darling Test Statistic	0.229	95% Bootstrap-t UCL	2769
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	3127
Kolmogorov-Smirnov Test Statistic	0.138	95% Percentile Bootstrap UCL	2485
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	2550
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3471
		97.5% Chebyshev(Mean, Sd) UCL	4160
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	5514
95% Approximate Gamma UCL	2906		
95% Adjusted Gamma UCL	3200		

Potential UCL to Use		Use 95% Student's-t UCL	2557

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_180	101-07-065	11	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	27.2	Minimum of Log Data	3.303
Maximum	1280	Maximum of Log Data	7.155
Mean	325.5	Mean of log Data	5.151
Median	217	SD of log Data	1.266
SD	392.8		
Coefficient of Variation	1.206		
Skewness	2.116		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.749	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	569	95% H-UCL	2241
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	979.6
95% Adjusted-CLT UCL	639.5	97.5% Chebyshev (MVUE) UCL	1258
95% Modified-t UCL	584.4	99% Chebyshev (MVUE) UCL	1804

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.687	Data appear Gamma Distributed at 5% Significance Level
Theta Star	473.8	
nu star	12.37	
Approximate Chi Square Value (.05)	5.47	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 540.9
Adjusted Chi Square Value	4.541	95% Jackknife UCL 569
		95% Standard Bootstrap UCL 534.5
Anderson-Darling Test Statistic	0.241	95% Bootstrap-t UCL 823.5
Anderson-Darling 5% Critical Value	0.746	95% Hall's Bootstrap UCL 1350
Kolmogorov-Smirnov Test Statistic	0.142	95% Percentile Bootstrap UCL 550
Kolmogorov-Smirnov 5% Critical Value	0.288	95% BCA Bootstrap UCL 666.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 896.2
		97.5% Chebyshev(Mean, Sd) UCL 1143
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 1628
95% Approximate Gamma UCL	736.1	
95% Adjusted Gamma UCL	886.7	

Potential UCL to Use		Use 95% Approximate Gamma UCL	736.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_181	101-07-066	11	Arsenic

General Statistics

Number of Valid Samples	7	Number of Unique Samples	7

Raw Statistics		Log-transformed Statistics	
Minimum	5.3	Minimum of Log Data	1.668
Maximum	15.5	Maximum of Log Data	2.741
Mean	9.643	Mean of log Data	2.208
Median	9.5	SD of log Data	0.369
SD	3.542		
Coefficient of Variation	0.367		
Skewness	0.624		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Test Statistic	0.986
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	12.24	95% H-UCL	13.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15.53
95% Adjusted-CLT UCL	12.18	97.5% Chebyshev (MVUE) UCL	18.08
95% Modified-t UCL	12.3	99% Chebyshev (MVUE) UCL	23.08

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.121	Data appear Normal at 5% Significance Level	
Theta Star	1.883		
nu star	71.7		
Approximate Chi Square Value (.05)	53.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0158	95% CLT UCL	11.84
Adjusted Chi Square Value	48.42	95% Jackknife UCL	12.24
		95% Standard Bootstrap UCL	11.69
Anderson-Darling Test Statistic	0.166	95% Bootstrap-t UCL	13.2
Anderson-Darling 5% Critical Value	0.709	95% Hall's Bootstrap UCL	14.3
Kolmogorov-Smirnov Test Statistic	0.139	95% Percentile Bootstrap UCL	11.79
Kolmogorov-Smirnov 5% Critical Value	0.312	95% BCA Bootstrap UCL	12.11
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.48
		97.5% Chebyshev(Mean, Sd) UCL	18
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	22.96
95% Approximate Gamma UCL	13		
95% Adjusted Gamma UCL	14.28		

Potential UCL to Use		Use 95% Student's-t UCL	12.24

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_182	101-07-066	11	Copper

General Statistics

Number of Valid Samples	7	Number of Unique Samples	6

Raw Statistics		Log-transformed Statistics	
Minimum	1880	Minimum of Log Data	7.539
Maximum	4740	Maximum of Log Data	8.464
Mean	2560	Mean of log Data	7.796
Median	2260	SD of log Data	0.327
SD	1016		
Coefficient of Variation	0.397		
Skewness	2.13		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.714	Shapiro Wilk Test Statistic	0.796
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	3306	95% H-UCL	3422
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3916
95% Adjusted-CLT UCL	3522	97.5% Chebyshev (MVUE) UCL	4510
95% Modified-t UCL	3358	99% Chebyshev (MVUE) UCL	5677

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.671	Data do not follow a Discernable Distribution (0.05)	
Theta Star	451.4		
nu star	79.4		
Approximate Chi Square Value (.05)	59.87	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0158	95% CLT UCL	3192
Adjusted Chi Square Value	54.77	95% Jackknife UCL	3306
		95% Standard Bootstrap UCL	3153
Anderson-Darling Test Statistic	0.777	95% Bootstrap-t UCL	5372
Anderson-Darling 5% Critical Value	0.709	95% Hall's Bootstrap UCL	6461
Kolmogorov-Smirnov Test Statistic	0.322	95% Percentile Bootstrap UCL	3187
Kolmogorov-Smirnov 5% Critical Value	0.312	95% BCA Bootstrap UCL	3404
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4234
		97.5% Chebyshev(Mean, Sd) UCL	4959
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6381
95% Approximate Gamma UCL	3395		
95% Adjusted Gamma UCL	3711		

Potential UCL to Use		
	Use 95% Student's-t UCL	3306
	or 95% Modified-t UCL	3358

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_183	101-07-066	11	Lead

General Statistics

Number of Valid Samples	7	Number of Unique Samples	7

Raw Statistics		Log-transformed Statistics	
Minimum	53.9	Minimum of Log Data	3.987
Maximum	3180	Maximum of Log Data	8.065
Mean	536.7	Mean of log Data	4.993
Median	96.3	SD of log Data	1.415
SD	1166		
Coefficient of Variation	2.173		
Skewness	2.639		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.484	Shapiro Wilk Test Statistic	0.719
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1393	95% H-UCL	6903
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1062
95% Adjusted-CLT UCL	1732	97.5% Chebyshev (MVUE) UCL	1382
95% Modified-t UCL	1467	99% Chebyshev (MVUE) UCL	2010

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.377	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1424		
nu star	5.275		
Approximate Chi Square Value (.05)	1.282	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0158	95% CLT UCL	1262
Adjusted Chi Square Value	0.783	95% Jackknife UCL	1393
		95% Standard Bootstrap UCL	1212
Anderson-Darling Test Statistic	1.411	95% Bootstrap-t UCL	18874
Anderson-Darling 5% Critical Value	0.753	95% Hall's Bootstrap UCL	10794
Kolmogorov-Smirnov Test Statistic	0.437	95% Percentile Bootstrap UCL	1410
Kolmogorov-Smirnov 5% Critical Value	0.328	95% BCA Bootstrap UCL	1851
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2458
		97.5% Chebyshev(Mean, Sd) UCL	3289
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4923
95% Approximate Gamma UCL	2209		
95% Adjusted Gamma UCL	3615		

Potential UCL to Use	Use 99% Chebyshev (Mean, Sd) UCL	4923
Recommended UCL exceeds the maximum observation		

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_184	101-07-082	11	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	8.9	Minimum of Log Data	2.186
Maximum	30.7	Maximum of Log Data	3.424
Mean	19.73	Mean of log Data	2.91
Median	18.3	SD of log Data	0.416
SD	7.626		
Coefficient of Variation	0.386		
Skewness	0.217		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.946	Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	24.46	95% H-UCL	27.56
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	31.91
95% Adjusted-CLT UCL	24.11	97.5% Chebyshev (MVUE) UCL	37.14
95% Modified-t UCL	24.49	99% Chebyshev (MVUE) UCL	47.43

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.767	Data appear Normal at 5% Significance Level	
Theta Star	4.139		
nu star	85.81		
Approximate Chi Square Value (.05)	65.46	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	23.91
Adjusted Chi Square Value	61.72	95% Jackknife UCL	24.46
		95% Standard Bootstrap UCL	23.75
Anderson-Darling Test Statistic	0.226	95% Bootstrap-t UCL	24.97
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	24.81
Kolmogorov-Smirnov Test Statistic	0.133	95% Percentile Bootstrap UCL	23.87
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	23.93
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	30.81
		97.5% Chebyshev(Mean, Sd) UCL	35.61
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	45.03
95% Approximate Gamma UCL	25.87		
95% Adjusted Gamma UCL	27.44		

Potential UCL to Use		Use 95% Student's-t UCL	24.46

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_185	101-07-082	11	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1710	Minimum of Log Data	7.444
Maximum	6580	Maximum of Log Data	8.792
Mean	3803	Mean of log Data	8.179
Median	3920	SD of log Data	0.391
SD	1418		
Coefficient of Variation	0.373		
Skewness	0.606		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Test Statistic	0.961
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4682	95% H-UCL	5172
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5999
95% Adjusted-CLT UCL	4683	97.5% Chebyshev (MVUE) UCL	6944
95% Modified-t UCL	4698	99% Chebyshev (MVUE) UCL	8801

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.334	Data appear Normal at 5% Significance Level	
Theta Star	713.1		
nu star	96.01		
Approximate Chi Square Value (.05)	74.41	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4581
Adjusted Chi Square Value	70.41	95% Jackknife UCL	4682
		95% Standard Bootstrap UCL	4535
Anderson-Darling Test Statistic	0.25	95% Bootstrap-t UCL	4778
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	4879
Kolmogorov-Smirnov Test Statistic	0.137	95% Percentile Bootstrap UCL	4536
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	4687
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5864
		97.5% Chebyshev(Mean, Sd) UCL	6756
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	8507
95% Approximate Gamma UCL	4907		
95% Adjusted Gamma UCL	5186		

Potential UCL to Use		Use 95% Student's-t UCL	4682

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_186	101-07-082	11	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	79.9	Minimum of Log Data	4.381
Maximum	370	Maximum of Log Data	5.914
Mean	200.3	Mean of log Data	5.145
Median	185	SD of log Data	0.599
SD	115.2		
Coefficient of Variation	0.575		
Skewness	0.529		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.867	Shapiro Wilk Test Statistic	0.898
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	271.7	95% H-UCL	345.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	378.4
95% Adjusted-CLT UCL	270.7	97.5% Chebyshev (MVUE) UCL	455.4
95% Modified-t UCL	272.8	99% Chebyshev (MVUE) UCL	606.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.325	Data appear Normal at 5% Significance Level	
Theta Star	86.15		
nu star	41.85		
Approximate Chi Square Value (.05)	28.02	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	263.5
Adjusted Chi Square Value	25.66	95% Jackknife UCL	271.7
		95% Standard Bootstrap UCL	260.1
Anderson-Darling Test Statistic	0.464	95% Bootstrap-t UCL	288
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	262.5
Kolmogorov-Smirnov Test Statistic	0.204	95% Percentile Bootstrap UCL	260.8
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	264.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	367.7
		97.5% Chebyshev(Mean, Sd) UCL	440.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	582.3
95% Approximate Gamma UCL	299.2		
95% Adjusted Gamma UCL	326.7		

Potential UCL to Use		Use 95% Student's-t UCL	271.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_187	101-09-014	11	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	9	Minimum of Log Data	2.197
Maximum	31.5	Maximum of Log Data	3.45
Mean	15.46	Mean of log Data	2.653
Median	13.3	SD of log Data	0.424
SD	7.293		
Coefficient of Variation	0.472		
Skewness	1.463		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.854	Shapiro Wilk Test Statistic	0.93
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	19.98	95% H-UCL	21.55
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.93
95% Adjusted-CLT UCL	20.72	97.5% Chebyshev (MVUE) UCL	29.06
95% Modified-t UCL	20.17	99% Chebyshev (MVUE) UCL	37.19
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.102	Data appear Normal at 5% Significance Level	
Theta Star	3.768		
nu star	73.84		
Approximate Chi Square Value (.05)	55.05	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	19.45
Adjusted Chi Square Value	51.64	95% Jackknife UCL	19.98
		95% Standard Bootstrap UCL	19.24
Anderson-Darling Test Statistic	0.338	95% Bootstrap-t UCL	23.26
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	36.17
Kolmogorov-Smirnov Test Statistic	0.144	95% Percentile Bootstrap UCL	19.47
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	20
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.05
		97.5% Chebyshev(Mean, Sd) UCL	30.64
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	39.64
95% Approximate Gamma UCL	20.73		
95% Adjusted Gamma UCL	22.1		
Potential UCL to Use		Use 95% Student's-t UCL	19.98

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_188	101-09-014	11	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1940	Minimum of Log Data	7.57
Maximum	6750	Maximum of Log Data	8.817
Mean	4053	Mean of log Data	8.214
Median	3430	SD of log Data	0.465
SD	1818		
Coefficient of Variation	0.448		
Skewness	0.409		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.913	Shapiro Wilk Test Statistic	0.934
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5180	95% H-UCL	5952
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6838
95% Adjusted-CLT UCL	5138	97.5% Chebyshev (MVUE) UCL	8040
95% Modified-t UCL	5194	99% Chebyshev (MVUE) UCL	10402

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.74	Data appear Normal at 5% Significance Level	
Theta Star	1084		
nu star	67.32		
Approximate Chi Square Value (.05)	49.44	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5050
Adjusted Chi Square Value	46.22	95% Jackknife UCL	5180
		95% Standard Bootstrap UCL	5006
Anderson-Darling Test Statistic	0.298	95% Bootstrap-t UCL	5323
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	5028
Kolmogorov-Smirnov Test Statistic	0.149	95% Percentile Bootstrap UCL	5054
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	5064
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6695
		97.5% Chebyshev(Mean, Sd) UCL	7838
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10082
95% Approximate Gamma UCL	5520		
95% Adjusted Gamma UCL	5904		

Potential UCL to Use		Use 95% Student's-t UCL	5180

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_189	101-09-014	11	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	99.3	Minimum of Log Data	4.598
Maximum	558	Maximum of Log Data	6.324
Mean	271.6	Mean of log Data	5.46
Median	260	SD of log Data	0.572
SD	155.8		
Coefficient of Variation	0.574		
Skewness	0.945		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.898	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	368.1	95% H-UCL	451.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	501.1
95% Adjusted-CLT UCL	374.5	97.5% Chebyshev (MVUE) UCL	600.4
95% Modified-t UCL	370.9	99% Chebyshev (MVUE) UCL	795.6

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.496	Data appear Normal at 5% Significance Level	
Theta Star	108.8		
nu star	44.93		
Approximate Chi Square Value (.05)	30.55	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	357
Adjusted Chi Square Value	28.08	95% Jackknife UCL	368.1
		95% Standard Bootstrap UCL	352.7
Anderson-Darling Test Statistic	0.256	95% Bootstrap-t UCL	419.9
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	493.5
Kolmogorov-Smirnov Test Statistic	0.149	95% Percentile Bootstrap UCL	357.3
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	368.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	497.9
		97.5% Chebyshev(Mean, Sd) UCL	595.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	788.2
95% Approximate Gamma UCL	399.4		
95% Adjusted Gamma UCL	434.6		

Potential UCL to Use		Use 95% Student's-t UCL	368.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_190	101-09-004	12	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	11	Minimum of Log Data	2.398
Maximum	48.5	Maximum of Log Data	3.882
Mean	29.61	Mean of log Data	3.293
Median	32.8	SD of log Data	0.503
SD	11.85		
Coefficient of Variation	0.4		
Skewness	-0.403		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.832
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	36.95	95% H-UCL	46
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	52.36
95% Adjusted-CLT UCL	35.54	97.5% Chebyshev (MVUE) UCL	62
95% Modified-t UCL	36.87	99% Chebyshev (MVUE) UCL	80.94

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.674	Data appear Normal at 5% Significance Level	
Theta Star	8.06		
nu star	66.13		
Approximate Chi Square Value (.05)	48.41	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	36.11
Adjusted Chi Square Value	45.23	95% Jackknife UCL	36.95
		95% Standard Bootstrap UCL	35.99
Anderson-Darling Test Statistic	0.68	95% Bootstrap-t UCL	36.41
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	35.74
Kolmogorov-Smirnov Test Statistic	0.248	95% Percentile Bootstrap UCL	35.69
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	35.14
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	46.83
		97.5% Chebyshev(Mean, Sd) UCL	54.27
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	68.9
95% Approximate Gamma UCL	40.44		
95% Adjusted Gamma UCL	43.29		

Potential UCL to Use		Use 95% Student's-t UCL	36.95

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_191	101-09-004	12	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2110	Minimum of Log Data	7.654
Maximum	8870	Maximum of Log Data	9.09
Mean	5706	Mean of log Data	8.536
Median	4810	SD of log Data	0.534
SD	2609		
Coefficient of Variation	0.457		
Skewness	-0.101		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.888	Shapiro Wilk Test Statistic	0.879
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	7323	95% H-UCL	9159
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10317
95% Adjusted-CLT UCL	7105	97.5% Chebyshev (MVUE) UCL	12284
95% Modified-t UCL	7318	99% Chebyshev (MVUE) UCL	16148

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.115	Data appear Normal at 5% Significance Level
Theta Star	1832	
nu star	56.07	
Approximate Chi Square Value (.05)	39.86	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 7136
Adjusted Chi Square Value	37	95% Jackknife UCL 7323
		95% Standard Bootstrap UCL 7093
Anderson-Darling Test Statistic	0.496	95% Bootstrap-t UCL 7362
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL 6910
Kolmogorov-Smirnov Test Statistic	0.236	95% Percentile Bootstrap UCL 7081
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 7033
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 9496
		97.5% Chebyshev(Mean, Sd) UCL 11136
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 14358
95% Approximate Gamma UCL	8026	
95% Adjusted Gamma UCL	8647	

Potential UCL to Use	Use 95% Student's-t UCL	7323

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_192	101-09-004	12	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	69.3	Minimum of Log Data	4.238
Maximum	8170	Maximum of Log Data	9.008
Mean	1197	Mean of log Data	6.035
Median	374	SD of log Data	1.255
SD	2618		
Coefficient of Variation	2.188		
Skewness	2.988		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.433	Shapiro Wilk Test Statistic	0.767
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2819	95% H-UCL	5217
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2334
95% Adjusted-CLT UCL	3560	97.5% Chebyshev (MVUE) UCL	2995
95% Modified-t UCL	2964	99% Chebyshev (MVUE) UCL	4294

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.467	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2564		
nu star	8.401		
Approximate Chi Square Value (.05)	2.969	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2632
Adjusted Chi Square Value	2.332	95% Jackknife UCL	2819
		95% Standard Bootstrap UCL	2570
Anderson-Darling Test Statistic	1.771	95% Bootstrap-t UCL	32515
Anderson-Darling 5% Critical Value	0.764	95% Hall's Bootstrap UCL	22353
Kolmogorov-Smirnov Test Statistic	0.445	95% Percentile Bootstrap UCL	2930
Kolmogorov-Smirnov 5% Critical Value	0.292	95% BCA Bootstrap UCL	3010
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5000
		97.5% Chebyshev(Mean, Sd) UCL	6646
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9879
95% Approximate Gamma UCL	3385		
95% Adjusted Gamma UCL	4311		

Potential UCL to Use	Use 99% Chebyshev (Mean, Sd) UCL	9879
Recommended UCL exceeds the maximum observation		

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_193	101-09-008	12	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	9.6	Minimum of Log Data	2.262
Maximum	57.1	Maximum of Log Data	4.045
Mean	36.54	Mean of log Data	3.433
Median	41	SD of log Data	0.687
SD	17.84		
Coefficient of Variation	0.488		
Skewness	-0.598		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.895	Shapiro Wilk Test Statistic	0.798
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	47.6	95% H-UCL	74.31
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	76.9
95% Adjusted-CLT UCL	45.06	97.5% Chebyshev (MVUE) UCL	93.72
95% Modified-t UCL	47.4	99% Chebyshev (MVUE) UCL	126.8

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.187	Data appear Normal at 5% Significance Level
Theta Star	16.71	
nu star	39.37	
Approximate Chi Square Value (.05)	26	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 46.32
Adjusted Chi Square Value	23.73	95% Jackknife UCL 47.6
		95% Standard Bootstrap UCL 45.57
Anderson-Darling Test Statistic	0.694	95% Bootstrap-t UCL 45.75
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL 44.27
Kolmogorov-Smirnov Test Statistic	0.209	95% Percentile Bootstrap UCL 45.54
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 44.93
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 62.46
		97.5% Chebyshev(Mean, Sd) UCL 73.67
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 95.7
95% Approximate Gamma UCL	55.34	
95% Adjusted Gamma UCL	60.63	

Potential UCL to Use	Use 95% Student's-t UCL	47.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_194	101-09-008	12	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1230	Minimum of Log Data	7.115
Maximum	17800	Maximum of Log Data	9.787
Mean	7494	Mean of log Data	8.631
Median	7980	SD of log Data	0.888
SD	5353		
Coefficient of Variation	0.714		
Skewness	0.774		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.933	Shapiro Wilk Test Statistic	0.934
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10813	95% H-UCL	21619
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18328
95% Adjusted-CLT UCL	10921	97.5% Chebyshev (MVUE) UCL	22857
95% Modified-t UCL	10889	99% Chebyshev (MVUE) UCL	31754

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.319	Data appear Normal at 5% Significance Level	
Theta Star	5684		
nu star	23.73		
Approximate Chi Square Value (.05)	13.65	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	10430
Adjusted Chi Square Value	12.06	95% Jackknife UCL	10813
		95% Standard Bootstrap UCL	10308
Anderson-Darling Test Statistic	0.25	95% Bootstrap-t UCL	11655
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	12750
Kolmogorov-Smirnov Test Statistic	0.186	95% Percentile Bootstrap UCL	10250
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	10787
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15273
		97.5% Chebyshev(Mean, Sd) UCL	18638
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	25250
95% Approximate Gamma UCL	13034		
95% Adjusted Gamma UCL	14745		

Potential UCL to Use		Use 95% Student's-t UCL	10813

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_195	101-09-008	12	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	43.5	Minimum of Log Data	3.773
Maximum	525	Maximum of Log Data	6.263
Mean	265.1	Mean of log Data	5.386
Median	262	SD of log Data	0.743
SD	150		
Coefficient of Variation	0.566		
Skewness	0.375		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.975	Shapiro Wilk Test Statistic	0.907
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	358	95% H-UCL	590.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	584.6
95% Adjusted-CLT UCL	354	97.5% Chebyshev (MVUE) UCL	717.6
95% Modified-t UCL	359.1	99% Chebyshev (MVUE) UCL	978.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.895	Data appear Normal at 5% Significance Level	
Theta Star	139.9		
nu star	34.11		
Approximate Chi Square Value (.05)	21.75	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	347.3
Adjusted Chi Square Value	19.7	95% Jackknife UCL	358
		95% Standard Bootstrap UCL	341
Anderson-Darling Test Statistic	0.227	95% Bootstrap-t UCL	375.7
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	364.9
Kolmogorov-Smirnov Test Statistic	0.129	95% Percentile Bootstrap UCL	345.8
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	345.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	482.9
		97.5% Chebyshev(Mean, Sd) UCL	577.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	762.4
95% Approximate Gamma UCL	415.6		
95% Adjusted Gamma UCL	459		

Potential UCL to Use		Use 95% Student's-t UCL	358

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_196	101-09-010	12	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13.8	Minimum of Log Data	2.625
Maximum	41.7	Maximum of Log Data	3.731
Mean	24.58	Mean of log Data	3.147
Median	20.4	SD of log Data	0.35
SD	8.875		
Coefficient of Variation	0.361		
Skewness	0.848		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Test Statistic	0.961
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	30.08	95% H-UCL	32.01
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	37.12
95% Adjusted-CLT UCL	30.34	97.5% Chebyshev (MVUE) UCL	42.56
95% Modified-t UCL	30.22	99% Chebyshev (MVUE) UCL	53.25

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.214	Data appear Normal at 5% Significance Level	
Theta Star	3.955		
nu star	111.9		
Approximate Chi Square Value (.05)	88.44	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	29.44
Adjusted Chi Square Value	84.05	95% Jackknife UCL	30.08
		95% Standard Bootstrap UCL	29.23
Anderson-Darling Test Statistic	0.312	95% Bootstrap-t UCL	32.28
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	31.23
Kolmogorov-Smirnov Test Statistic	0.224	95% Percentile Bootstrap UCL	29.29
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	30.02
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	37.47
		97.5% Chebyshev(Mean, Sd) UCL	43.05
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	54.01
95% Approximate Gamma UCL	31.08		
95% Adjusted Gamma UCL	32.71		

Potential UCL to Use	Use 95% Student's-t UCL	30.08

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_197	101-09-010	12	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3250	Minimum of Log Data	8.086
Maximum	8120	Maximum of Log Data	9.002
Mean	5782	Mean of log Data	8.603
Median	6260	SD of log Data	0.373
SD	2005		
Coefficient of Variation	0.347		
Skewness	-0.11		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.875	Shapiro Wilk Test Statistic	0.869
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	7025	95% H-UCL	7730
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8969
95% Adjusted-CLT UCL	6855	97.5% Chebyshev (MVUE) UCL	10342
95% Modified-t UCL	7021	99% Chebyshev (MVUE) UCL	13038
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.826	Data appear Normal at 5% Significance Level	
Theta Star	992.6		
nu star	104.9		
Approximate Chi Square Value (.05)	82.23	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6881
Adjusted Chi Square Value	78.01	95% Jackknife UCL	7025
		95% Standard Bootstrap UCL	6834
Anderson-Darling Test Statistic	0.54	95% Bootstrap-t UCL	7032
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	6682
Kolmogorov-Smirnov Test Statistic	0.192	95% Percentile Bootstrap UCL	6843
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6830
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8695
		97.5% Chebyshev(Mean, Sd) UCL	9956
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	12432
95% Approximate Gamma UCL	7374		
95% Adjusted Gamma UCL	7772		
Potential UCL to Use		Use 95% Student's-t UCL	7025

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_198	101-09-010	12	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	178	Minimum of Log Data	5.182
Maximum	1140	Maximum of Log Data	7.039
Mean	369.1	Mean of log Data	5.743
Median	276	SD of log Data	0.541
SD	296		
Coefficient of Variation	0.802		
Skewness	2.74		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.598	Shapiro Wilk Test Statistic	0.811
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	552.6	95% H-UCL	568
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	638
95% Adjusted-CLT UCL	627.7	97.5% Chebyshev (MVUE) UCL	760.6
95% Modified-t UCL	567.6	99% Chebyshev (MVUE) UCL	1001

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.159	Data do not follow a Discernable Distribution (0.05)	
Theta Star	171		
nu star	38.86		
Approximate Chi Square Value (.05)	25.58	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	531.4
Adjusted Chi Square Value	23.33	95% Jackknife UCL	552.6
		95% Standard Bootstrap UCL	518.7
Anderson-Darling Test Statistic	1.036	95% Bootstrap-t UCL	1031
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	1212
Kolmogorov-Smirnov Test Statistic	0.295	95% Percentile Bootstrap UCL	555.2
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	645.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	799.2
		97.5% Chebyshev(Mean, Sd) UCL	985.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1351
95% Approximate Gamma UCL	560.7		
95% Adjusted Gamma UCL	614.7		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	799.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_199	101-09-025A	12	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	7	Minimum of Log Data	1.946
Maximum	33.7	Maximum of Log Data	3.517
Mean	14.64	Mean of log Data	2.591
Median	13.6	SD of log Data	0.433
SD	7.684		
Coefficient of Variation	0.525		
Skewness	2.216		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.746	Shapiro Wilk Test Statistic	0.913
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	19.41	95% H-UCL	20.53
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	23.72
95% Adjusted-CLT UCL	20.88	97.5% Chebyshev (MVUE) UCL	27.7
95% Modified-t UCL	19.72	99% Chebyshev (MVUE) UCL	35.54

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.783	Data appear Gamma Distributed at 5% Significance Level
Theta Star	3.872	
nu star	68.09	
Approximate Chi Square Value (.05)	50.09	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 18.86
Adjusted Chi Square Value	46.85	95% Jackknife UCL 19.41
		95% Standard Bootstrap UCL 18.5
Anderson-Darling Test Statistic	0.58	95% Bootstrap-t UCL 23.68
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL 37.79
Kolmogorov-Smirnov Test Statistic	0.268	95% Percentile Bootstrap UCL 18.98
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 20.66
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 25.81
		97.5% Chebyshev(Mean, Sd) UCL 30.64
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 40.13
95% Approximate Gamma UCL	19.9	
95% Adjusted Gamma UCL	21.28	

Potential UCL to Use		Use 95% Approximate Gamma UCL	19.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_200	101-09-025A	12	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1900	Minimum of Log Data	7.55
Maximum	9970	Maximum of Log Data	9.207
Mean	4199	Mean of log Data	8.222
Median	3530	SD of log Data	0.494
SD	2481		
Coefficient of Variation	0.591		
Skewness	1.89		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.782	Shapiro Wilk Test Statistic	0.928
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5737	95% H-UCL	6277
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7161
95% Adjusted-CLT UCL	6116	97.5% Chebyshev (MVUE) UCL	8466
95% Modified-t UCL	5824	99% Chebyshev (MVUE) UCL	11031

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.944	Data appear Gamma Distributed at 5% Significance Level
Theta Star	1426	
nu star	52.99	
Approximate Chi Square Value (.05)	37.27	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 5559
Adjusted Chi Square Value	34.51	95% Jackknife UCL 5737
		95% Standard Bootstrap UCL 5485
Anderson-Darling Test Statistic	0.544	95% Bootstrap-t UCL 8462
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL 14090
Kolmogorov-Smirnov Test Statistic	0.271	95% Percentile Bootstrap UCL 5618
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 6084
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 7804
		97.5% Chebyshev(Mean, Sd) UCL 9364
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 12428
95% Approximate Gamma UCL	5970	
95% Adjusted Gamma UCL	6448	

Potential UCL to Use		Use 95% Approximate Gamma UCL	5970

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_201	101-09-025A	12	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	26	Minimum of Log Data	3.258
Maximum	281	Maximum of Log Data	5.638
Mean	180	Mean of log Data	5.041
Median	188	SD of log Data	0.712
SD	76.39		
Coefficient of Variation	0.424		
Skewness	-0.711		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.938	Shapiro Wilk Test Statistic	0.72
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	227.3	95% H-UCL	391.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	397.3
95% Adjusted-CLT UCL	215.4	97.5% Chebyshev (MVUE) UCL	485.8
95% Modified-t UCL	226.3	99% Chebyshev (MVUE) UCL	659.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.374	Data appear Normal at 5% Significance Level	
Theta Star	75.82		
nu star	42.73		
Approximate Chi Square Value (.05)	28.75	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	221.9
Adjusted Chi Square Value	26.35	95% Jackknife UCL	227.3
		95% Standard Bootstrap UCL	219.2
Anderson-Darling Test Statistic	0.744	95% Bootstrap-t UCL	223.5
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	221.2
Kolmogorov-Smirnov Test Statistic	0.285	95% Percentile Bootstrap UCL	216.9
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	214.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	291
		97.5% Chebyshev(Mean, Sd) UCL	339
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	433.3
95% Approximate Gamma UCL	267.6		
95% Adjusted Gamma UCL	291.9		

Potential UCL to Use		Use 95% Student's-t UCL	227.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_202	101-09-027	12	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	8.5	Minimum of Log Data	2.14
Maximum	27.3	Maximum of Log Data	3.307
Mean	16.68	Mean of log Data	2.737
Median	17.9	SD of log Data	0.427
SD	6.685		
Coefficient of Variation	0.401		
Skewness	0.247		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.919	Shapiro Wilk Test Statistic	0.904
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	20.82	95% H-UCL	23.54
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	27.22
95% Adjusted-CLT UCL	20.54	97.5% Chebyshev (MVUE) UCL	31.76
95% Modified-t UCL	20.85	99% Chebyshev (MVUE) UCL	40.68
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.488	Data appear Normal at 5% Significance Level	
Theta Star	3.716		
nu star	80.78		
Approximate Chi Square Value (.05)	61.07	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	20.34
Adjusted Chi Square Value	57.47	95% Jackknife UCL	20.82
		95% Standard Bootstrap UCL	20.17
Anderson-Darling Test Statistic	0.424	95% Bootstrap-t UCL	20.87
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	20.79
Kolmogorov-Smirnov Test Statistic	0.212	95% Percentile Bootstrap UCL	20.16
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	20.34
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.39
		97.5% Chebyshev(Mean, Sd) UCL	30.59
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	38.85
95% Approximate Gamma UCL	22.06		
95% Adjusted Gamma UCL	23.44		
Potential UCL to Use		Use 95% Student's-t UCL	20.82

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_203	101-09-027	12	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1380	Minimum of Log Data	7.23
Maximum	6840	Maximum of Log Data	8.831
Mean	3468	Mean of log Data	8.007
Median	3280	SD of log Data	0.581
SD	1909		
Coefficient of Variation	0.551		
Skewness	0.527		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.901	Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4651	95% H-UCL	5860
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6469
95% Adjusted-CLT UCL	4634	97.5% Chebyshev (MVUE) UCL	7763
95% Modified-t UCL	4670	99% Chebyshev (MVUE) UCL	10305

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.485	Data appear Normal at 5% Significance Level	
Theta Star	1395		
nu star	44.73		
Approximate Chi Square Value (.05)	30.39	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4515
Adjusted Chi Square Value	27.92	95% Jackknife UCL	4651
		95% Standard Bootstrap UCL	4431
Anderson-Darling Test Statistic	0.46	95% Bootstrap-t UCL	4817
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	4483
Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	4452
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	4489
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6242
		97.5% Chebyshev(Mean, Sd) UCL	7443
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9801
95% Approximate Gamma UCL	5104		
95% Adjusted Gamma UCL	5556		

Potential UCL to Use		Use 95% Student's-t UCL	4651

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_204	101-09-027	12	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	188	Minimum of Log Data	5.236
Maximum	1190	Maximum of Log Data	7.082
Mean	403.3	Mean of log Data	5.827
Median	352	SD of log Data	0.569
SD	309.8		
Coefficient of Variation	0.768		
Skewness	2.482		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.672	Shapiro Wilk Test Statistic	0.874
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	595.4	95% H-UCL	648.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	719.8
95% Adjusted-CLT UCL	664.5	97.5% Chebyshev (MVUE) UCL	862
95% Modified-t UCL	609.6	99% Chebyshev (MVUE) UCL	1141

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.109	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	191.2		
nu star	37.97		
Approximate Chi Square Value (.05)	24.86	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	573.2
Adjusted Chi Square Value	22.64	95% Jackknife UCL	595.4
		95% Standard Bootstrap UCL	572.4
Anderson-Darling Test Statistic	0.694	95% Bootstrap-t UCL	896.7
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	1257
Kolmogorov-Smirnov Test Statistic	0.229	95% Percentile Bootstrap UCL	587.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	647.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	853.5
		97.5% Chebyshev(Mean, Sd) UCL	1048
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1431
95% Approximate Gamma UCL	616.1		
95% Adjusted Gamma UCL	676.3		

Potential UCL to Use		Use 95% Approximate Gamma UCL	616.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_205	101-09-032	12	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	13.3	Minimum of Log Data	2.588
Maximum	40.8	Maximum of Log Data	3.709
Mean	27.84	Mean of log Data	3.281
Median	27.9	SD of log Data	0.331
SD	8.48		
Coefficient of Variation	0.305		
Skewness	0.198		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.909	Shapiro Wilk Test Statistic	0.891
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	33.1	95% H-UCL	35.78
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	41.45
95% Adjusted-CLT UCL	32.69	97.5% Chebyshev (MVUE) UCL	47.3
95% Modified-t UCL	33.13	99% Chebyshev (MVUE) UCL	58.78

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.538	Data appear Normal at 5% Significance Level	
Theta Star	3.694		
nu star	135.7		
Approximate Chi Square Value (.05)	109.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	32.49
Adjusted Chi Square Value	104.9	95% Jackknife UCL	33.1
		95% Standard Bootstrap UCL	32.3
Anderson-Darling Test Statistic	0.472	95% Bootstrap-t UCL	34.54
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	36.97
Kolmogorov-Smirnov Test Statistic	0.207	95% Percentile Bootstrap UCL	32.24
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	32.19
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	40.17
		97.5% Chebyshev(Mean, Sd) UCL	45.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	55.97
95% Approximate Gamma UCL	34.42		
95% Adjusted Gamma UCL	36.03		

Potential UCL to Use	Use 95% Student's-t UCL	33.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_206	101-09-032	12	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2320	Minimum of Log Data	7.749
Maximum	9940	Maximum of Log Data	9.204
Mean	6921	Mean of log Data	8.759
Median	7780	SD of log Data	0.475
SD	2535		
Coefficient of Variation	0.366		
Skewness	-0.806		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.924	Shapiro Wilk Test Statistic	0.843
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	8493	95% H-UCL	10416
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11942
95% Adjusted-CLT UCL	8069	97.5% Chebyshev (MVUE) UCL	14068
95% Modified-t UCL	8455	99% Chebyshev (MVUE) UCL	18243
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.176	Data appear Normal at 5% Significance Level	
Theta Star	1658		
nu star	75.16		
Approximate Chi Square Value (.05)	56.19	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	8311
Adjusted Chi Square Value	52.75	95% Jackknife UCL	8493
		95% Standard Bootstrap UCL	8206
Anderson-Darling Test Statistic	0.564	95% Bootstrap-t UCL	8240
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	8038
Kolmogorov-Smirnov Test Statistic	0.26	95% Percentile Bootstrap UCL	8181
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	8004
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	10605
		97.5% Chebyshev(Mean, Sd) UCL	12199
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15330
95% Approximate Gamma UCL	9257		
95% Adjusted Gamma UCL	9862		
Potential UCL to Use		Use 95% Student's-t UCL	8493

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_207	101-09-032	12	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	209	Minimum of Log Data	5.342
Maximum	591	Maximum of Log Data	6.382
Mean	395.7	Mean of log Data	5.924
Median	389	SD of log Data	0.362
SD	137.8		
Coefficient of Variation	0.348		
Skewness	0.273		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.934	Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	481.1	95% H-UCL	522.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	606.6
95% Adjusted-CLT UCL	475.7	97.5% Chebyshev (MVUE) UCL	697.6
95% Modified-t UCL	481.8	99% Chebyshev (MVUE) UCL	876.4
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.07	Data appear Normal at 5% Significance Level	
Theta Star	65.18		
nu star	109.3		
Approximate Chi Square Value (.05)	86.14	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	471.2
Adjusted Chi Square Value	81.81	95% Jackknife UCL	481.1
		95% Standard Bootstrap UCL	466.4
Anderson-Darling Test Statistic	0.244	95% Bootstrap-t UCL	488.6
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	480.7
Kolmogorov-Smirnov Test Statistic	0.145	95% Percentile Bootstrap UCL	463.3
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	464
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	595.9
		97.5% Chebyshev(Mean, Sd) UCL	682.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	852.6
95% Approximate Gamma UCL	501.9		
95% Adjusted Gamma UCL	528.4		
Potential UCL to Use		Use 95% Student's-t UCL	481.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_208	101-09-033	12	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	23.1	Minimum of Log Data	3.14
Maximum	89.1	Maximum of Log Data	4.49
Mean	39.87	Mean of log Data	3.585
Median	33.4	SD of log Data	0.445
SD	21.78		
Coefficient of Variation	0.546		
Skewness	1.849		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.736	Shapiro Wilk Test Statistic	0.84
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	53.37	95% H-UCL	56.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	65.05
95% Adjusted-CLT UCL	56.59	97.5% Chebyshev (MVUE) UCL	76.18
95% Modified-t UCL	54.11	99% Chebyshev (MVUE) UCL	98.04

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.49	Data appear Lognormal at 5% Significance Level	
Theta Star	11.42		
nu star	62.82		
Approximate Chi Square Value (.05)	45.59	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	51.81
Adjusted Chi Square Value	42.51	95% Jackknife UCL	53.37
		95% Standard Bootstrap UCL	51.15
Anderson-Darling Test Statistic	0.86	95% Bootstrap-t UCL	91.74
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	135.1
Kolmogorov-Smirnov Test Statistic	0.338	95% Percentile Bootstrap UCL	51.89
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	56.88
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	71.51
		97.5% Chebyshev(Mean, Sd) UCL	85.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	112.1
95% Approximate Gamma UCL	54.94		
95% Adjusted Gamma UCL	58.92		

Potential UCL to Use		
	Use 95% Student's-t UCL	53.37
	or 95% Modified-t UCL	54.11
	or 95% H-UCL	56.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_209	101-09-033	12	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2340	Minimum of Log Data	7.758
Maximum	17500	Maximum of Log Data	9.77
Mean	7574	Mean of log Data	8.796
Median	7280	SD of log Data	0.562
SD	4345		
Coefficient of Variation	0.574		
Skewness	1.545		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.873	Shapiro Wilk Test Statistic	0.973
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10268	95% H-UCL	12476
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13894
95% Adjusted-CLT UCL	10754	97.5% Chebyshev (MVUE) UCL	16623
95% Modified-t UCL	10392	99% Chebyshev (MVUE) UCL	21982

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.621	Data appear Normal at 5% Significance Level
Theta Star	2890	
nu star	47.18	
Approximate Chi Square Value (.05)	32.41	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 9957
Adjusted Chi Square Value	29.85	95% Jackknife UCL 10268
		95% Standard Bootstrap UCL 9808
Anderson-Darling Test Statistic	0.24	95% Bootstrap-t UCL 11663
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL 21678
Kolmogorov-Smirnov Test Statistic	0.143	95% Percentile Bootstrap UCL 10051
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 10361
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 13888
		97.5% Chebyshev(Mean, Sd) UCL 16620
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 21986
95% Approximate Gamma UCL	11024	
95% Adjusted Gamma UCL	11969	

Potential UCL to Use	Use 95% Student's-t UCL	10268

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_210	101-09-033	12	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	211	Minimum of Log Data	5.352
Maximum	1610	Maximum of Log Data	7.384
Mean	580.1	Mean of log Data	6.109
Median	357	SD of log Data	0.727
SD	475.1		
Coefficient of Variation	0.819		
Skewness	1.508		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.793	Shapiro Wilk Test Statistic	0.888
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	874.6	95% H-UCL	1176
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1179
95% Adjusted-CLT UCL	925.7	97.5% Chebyshev (MVUE) UCL	1445
95% Modified-t UCL	887.9	99% Chebyshev (MVUE) UCL	1966

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.487	Data appear Gamma Distributed at 5% Significance Level
Theta Star	390.2	
nu star	26.76	
Approximate Chi Square Value (.05)	15.96	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 840.6
Adjusted Chi Square Value	14.23	95% Jackknife UCL 874.6
		95% Standard Bootstrap UCL 828.1
Anderson-Darling Test Statistic	0.604	95% Bootstrap-t UCL 1098
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL 924.9
Kolmogorov-Smirnov Test Statistic	0.221	95% Percentile Bootstrap UCL 827.8
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL 907.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 1270
		97.5% Chebyshev(Mean, Sd) UCL 1569
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 2156
95% Approximate Gamma UCL	972.3	
95% Adjusted Gamma UCL	1090	

Potential UCL to Use		Use 95% Approximate Gamma UCL	972.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_211	101-09-059	13	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3.8	Minimum of Log Data	1.335
Maximum	19.7	Maximum of Log Data	2.981
Mean	10.51	Mean of log Data	2.225
Median	9.8	SD of log Data	0.558
SD	5.285		
Coefficient of Variation	0.503		
Skewness	0.404		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.964	Shapiro Wilk Test Statistic	0.956
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	13.79	95% H-UCL	17.36
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	19.36
95% Adjusted-CLT UCL	13.66	97.5% Chebyshev (MVUE) UCL	23.15
95% Modified-t UCL	13.83	99% Chebyshev (MVUE) UCL	30.59

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.791	Data appear Normal at 5% Significance Level	
Theta Star	3.766		
nu star	50.24		
Approximate Chi Square Value (.05)	34.96	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	13.41
Adjusted Chi Square Value	32.3	95% Jackknife UCL	13.79
		95% Standard Bootstrap UCL	13.19
Anderson-Darling Test Statistic	0.191	95% Bootstrap-t UCL	14.26
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	14.17
Kolmogorov-Smirnov Test Statistic	0.129	95% Percentile Bootstrap UCL	13.32
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	13.39
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	18.19
		97.5% Chebyshev(Mean, Sd) UCL	21.51
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	28.04
95% Approximate Gamma UCL	15.1		
95% Adjusted Gamma UCL	16.35		

Potential UCL to Use		Use 95% Student's-t UCL	13.79

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_212	101-09-059	13	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	364	Minimum of Log Data	5.897
Maximum	9390	Maximum of Log Data	9.147
Mean	3930	Mean of log Data	7.985
Median	4220	SD of log Data	0.966
SD	2571		
Coefficient of Variation	0.654		
Skewness	0.89		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Test Statistic	0.83
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5524	95% H-UCL	14052
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10721
95% Adjusted-CLT UCL	5612	97.5% Chebyshev (MVUE) UCL	13468
95% Modified-t UCL	5566	99% Chebyshev (MVUE) UCL	18864

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.315	Data appear Normal at 5% Significance Level	
Theta Star	2988		
nu star	23.68		
Approximate Chi Square Value (.05)	13.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5340
Adjusted Chi Square Value	12.02	95% Jackknife UCL	5524
		95% Standard Bootstrap UCL	5284
Anderson-Darling Test Statistic	0.624	95% Bootstrap-t UCL	5725
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	6681
Kolmogorov-Smirnov Test Statistic	0.255	95% Percentile Bootstrap UCL	5273
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	5509
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7666
		97.5% Chebyshev(Mean, Sd) UCL	9282
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	12457
95% Approximate Gamma UCL	6841		
95% Adjusted Gamma UCL	7740		

Potential UCL to Use		Use 95% Student's-t UCL	5524

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_213	101-09-059	13	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	21.9	Minimum of Log Data	3.086
Maximum	1350	Maximum of Log Data	7.208
Mean	302.9	Mean of log Data	4.98
Median	156	SD of log Data	1.364
SD	412.5		
Coefficient of Variation	1.362		
Skewness	2.478		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.668	Shapiro Wilk Test Statistic	0.932
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	558.6	95% H-UCL	2781
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	959.6
95% Adjusted-CLT UCL	650.4	97.5% Chebyshev (MVUE) UCL	1239
95% Modified-t UCL	577.5	99% Chebyshev (MVUE) UCL	1788

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.613	Data appear Gamma Distributed at 5% Significance Level
Theta Star	493.9	
nu star	11.04	
Approximate Chi Square Value (.05)	4.6	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 529
Adjusted Chi Square Value	3.763	95% Jackknife UCL 558.6
		95% Standard Bootstrap UCL 511.2
Anderson-Darling Test Statistic	0.37	95% Bootstrap-t UCL 915.3
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL 1393
Kolmogorov-Smirnov Test Statistic	0.193	95% Percentile Bootstrap UCL 554.9
Kolmogorov-Smirnov 5% Critical Value	0.289	95% BCA Bootstrap UCL 686
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 902.2
		97.5% Chebyshev(Mean, Sd) UCL 1162
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 1671
95% Approximate Gamma UCL	726.7	
95% Adjusted Gamma UCL	888.3	

Potential UCL to Use		Use 95% Approximate Gamma UCL	726.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_214	101-09-062	13	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4.6	Minimum of Log Data	1.526
Maximum	31.8	Maximum of Log Data	3.459
Mean	18.72	Mean of log Data	2.795
Median	18.2	SD of log Data	0.601
SD	9.081		
Coefficient of Variation	0.485		
Skewness	0.11		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.958	Shapiro Wilk Test Statistic	0.912
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	24.35	95% H-UCL	33.13
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	36.21
95% Adjusted-CLT UCL	23.82	97.5% Chebyshev (MVUE) UCL	43.59
95% Modified-t UCL	24.37	99% Chebyshev (MVUE) UCL	58.09

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.649	Data appear Normal at 5% Significance Level
Theta Star	7.066	
nu star	47.69	
Approximate Chi Square Value (.05)	32.84	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 23.7
Adjusted Chi Square Value	30.26	95% Jackknife UCL 24.35
		95% Standard Bootstrap UCL 23.3
Anderson-Darling Test Statistic	0.248	95% Bootstrap-t UCL 25.1
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL 23.94
Kolmogorov-Smirnov Test Statistic	0.147	95% Percentile Bootstrap UCL 23.1
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 23.59
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 31.92
		97.5% Chebyshev(Mean, Sd) UCL 37.62
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 48.84
95% Approximate Gamma UCL	27.19	
95% Adjusted Gamma UCL	29.5	

Potential UCL to Use	Use 95% Student's-t UCL	24.35

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_215	101-09-062	13	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1410	Minimum of Log Data	7.251
Maximum	5460	Maximum of Log Data	8.605
Mean	3828	Mean of log Data	8.187
Median	4110	SD of log Data	0.412
SD	1235		
Coefficient of Variation	0.323		
Skewness	-0.848		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.957	Shapiro Wilk Test Statistic	0.849
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4593	95% H-UCL	5367
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6216
95% Adjusted-CLT UCL	4380	97.5% Chebyshev (MVUE) UCL	7230
95% Modified-t UCL	4574	99% Chebyshev (MVUE) UCL	9222

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.447	Data appear Normal at 5% Significance Level	
Theta Star	702.7		
nu star	98.05		
Approximate Chi Square Value (.05)	76.21	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4505
Adjusted Chi Square Value	72.16	95% Jackknife UCL	4593
		95% Standard Bootstrap UCL	4464
Anderson-Darling Test Statistic	0.455	95% Bootstrap-t UCL	4483
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	4403
Kolmogorov-Smirnov Test Statistic	0.194	95% Percentile Bootstrap UCL	4443
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	4393
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5622
		97.5% Chebyshev(Mean, Sd) UCL	6398
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7923
95% Approximate Gamma UCL	4925		
95% Adjusted Gamma UCL	5201		

Potential UCL to Use		Use 95% Student's-t UCL	4593

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_216	101-09-062	13	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	122	Minimum of Log Data	4.804
Maximum	1070	Maximum of Log Data	6.975
Mean	539	Mean of log Data	6.141
Median	514	SD of log Data	0.634
SD	279.6		
Coefficient of Variation	0.519		
Skewness	0.569		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.958	Shapiro Wilk Test Statistic	0.914
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	712.3	95% H-UCL	1001
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1073
95% Adjusted-CLT UCL	711.2	97.5% Chebyshev (MVUE) UCL	1299
95% Modified-t UCL	715.2	99% Chebyshev (MVUE) UCL	1741

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.414	Data appear Normal at 5% Significance Level	
Theta Star	223.3		
nu star	43.44		
Approximate Chi Square Value (.05)	29.33	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	692.3
Adjusted Chi Square Value	26.91	95% Jackknife UCL	712.3
		95% Standard Bootstrap UCL	683.1
Anderson-Darling Test Statistic	0.296	95% Bootstrap-t UCL	741.5
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	848
Kolmogorov-Smirnov Test Statistic	0.215	95% Percentile Bootstrap UCL	690.3
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	704.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	945.2
		97.5% Chebyshev(Mean, Sd) UCL	1121
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1466
95% Approximate Gamma UCL	798.4		
95% Adjusted Gamma UCL	870.3		

Potential UCL to Use		Use 95% Student's-t UCL	712.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_217	101-09-064	13	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	9.6	Minimum of Log Data	2.262
Maximum	74.7	Maximum of Log Data	4.313
Mean	30	Mean of log Data	3.211
Median	22.7	SD of log Data	0.653
SD	20.43		
Coefficient of Variation	0.681		
Skewness	1.413		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.867	Shapiro Wilk Test Statistic	0.975
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	42.66	95% H-UCL	55.51
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	58.83
95% Adjusted-CLT UCL	44.63	97.5% Chebyshev (MVUE) UCL	71.37
95% Modified-t UCL	43.2	99% Chebyshev (MVUE) UCL	95.98
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.928	Data appear Normal at 5% Significance Level	
Theta Star	15.56		
nu star	34.7		
Approximate Chi Square Value (.05)	22.22	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	41.2
Adjusted Chi Square Value	20.14	95% Jackknife UCL	42.66
		95% Standard Bootstrap UCL	40.37
Anderson-Darling Test Statistic	0.239	95% Bootstrap-t UCL	50.05
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	53.73
Kolmogorov-Smirnov Test Statistic	0.15	95% Percentile Bootstrap UCL	41.28
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	43.01
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	59.68
		97.5% Chebyshev(Mean, Sd) UCL	72.52
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	97.75
95% Approximate Gamma UCL	46.84		
95% Adjusted Gamma UCL	51.68		
Potential UCL to Use		Use 95% Student's-t UCL	42.66

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_218	101-09-064	13	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3930	Minimum of Log Data	8.276
Maximum	18500	Maximum of Log Data	9.826
Mean	7773	Mean of log Data	8.837
Median	6120	SD of log Data	0.493
SD	4598		
Coefficient of Variation	0.592		
Skewness	1.863		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.792	Shapiro Wilk Test Statistic	0.923
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	10624	95% H-UCL	11600
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	13237
95% Adjusted-CLT UCL	11312	97.5% Chebyshev (MVUE) UCL	15647
95% Modified-t UCL	10782	99% Chebyshev (MVUE) UCL	20383

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.936	Data appear Gamma Distributed at 5% Significance Level
Theta Star	2647	
nu star	52.85	
Approximate Chi Square Value (.05)	37.15	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 10295
Adjusted Chi Square Value	34.4	95% Jackknife UCL 10624
		95% Standard Bootstrap UCL 10103
Anderson-Darling Test Statistic	0.469	95% Bootstrap-t UCL 13794
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL 20136
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL 10469
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 11266
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 14455
		97.5% Chebyshev(Mean, Sd) UCL 17345
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 23024
95% Approximate Gamma UCL	11058	
95% Adjusted Gamma UCL	11945	

Potential UCL to Use		Use 95% Approximate Gamma UCL	11058

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_219	101-09-064	13	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	126	Minimum of Log Data	4.836
Maximum	434	Maximum of Log Data	6.073
Mean	232.2	Mean of log Data	5.326
Median	151	SD of log Data	0.517
SD	123.7		
Coefficient of Variation	0.532		
Skewness	0.723		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.811	Shapiro Wilk Test Statistic	0.819
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	308.9	95% H-UCL	359.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	407.5
95% Adjusted-CLT UCL	310.6	97.5% Chebyshev (MVUE) UCL	483.7
95% Modified-t UCL	310.5	99% Chebyshev (MVUE) UCL	633.6
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.915	Data do not follow a Discernable Distribution (0.05)	
Theta Star	79.66		
nu star	52.48		
Approximate Chi Square Value (.05)	36.84	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	300
Adjusted Chi Square Value	34.09	95% Jackknife UCL	308.9
		95% Standard Bootstrap UCL	297.9
Anderson-Darling Test Statistic	0.816	95% Bootstrap-t UCL	339.4
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	301.3
Kolmogorov-Smirnov Test Statistic	0.301	95% Percentile Bootstrap UCL	299.8
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	310.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	411.9
		97.5% Chebyshev(Mean, Sd) UCL	489.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	642.3
95% Approximate Gamma UCL	330.8		
95% Adjusted Gamma UCL	357.4		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	411.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_220	101-09-067	13	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	20.7	Minimum of Log Data	3.03
Maximum	44.8	Maximum of Log Data	3.802
Mean	32.27	Mean of log Data	3.448
Median	35	SD of log Data	0.246
SD	7.671		
Coefficient of Variation	0.238		
Skewness	0.0539		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.965	Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	37.02	95% H-UCL	38.45
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	43.9
95% Adjusted-CLT UCL	36.52	97.5% Chebyshev (MVUE) UCL	48.92
95% Modified-t UCL	37.03	99% Chebyshev (MVUE) UCL	58.79
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	12.87	Data appear Normal at 5% Significance Level	
Theta Star	2.508		
nu star	231.6		
Approximate Chi Square Value (.05)	197.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	36.47
Adjusted Chi Square Value	190.7	95% Jackknife UCL	37.02
		95% Standard Bootstrap UCL	36.26
Anderson-Darling Test Statistic	0.279	95% Bootstrap-t UCL	37.02
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	36.43
Kolmogorov-Smirnov Test Statistic	0.224	95% Percentile Bootstrap UCL	36.23
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	36.17
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	43.41
		97.5% Chebyshev(Mean, Sd) UCL	48.24
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	57.71
95% Approximate Gamma UCL	37.86		
95% Adjusted Gamma UCL	39.19		
Potential UCL to Use		Use 95% Student's-t UCL	37.02

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_221	101-09-067	13	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	4310	Minimum of Log Data	8.369
Maximum	6890	Maximum of Log Data	8.838
Mean	5410	Mean of log Data	8.584
Median	5150	SD of log Data	0.165
SD	901.2		
Coefficient of Variation	0.167		
Skewness	0.373		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.941	Shapiro Wilk Test Statistic	0.947
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5969	95% H-UCL	6049
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6711
95% Adjusted-CLT UCL	5944	97.5% Chebyshev (MVUE) UCL	7274
95% Modified-t UCL	5975	99% Chebyshev (MVUE) UCL	8380

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	27.52	Data appear Normal at 5% Significance Level	
Theta Star	196.6		
nu star	495.3		
Approximate Chi Square Value (.05)	444.7	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5904
Adjusted Chi Square Value	434.6	95% Jackknife UCL	5969
		95% Standard Bootstrap UCL	5878
Anderson-Darling Test Statistic	0.278	95% Bootstrap-t UCL	6036
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	5922
Kolmogorov-Smirnov Test Statistic	0.168	95% Percentile Bootstrap UCL	5871
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	5880
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6719
		97.5% Chebyshev(Mean, Sd) UCL	7286
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	8399
95% Approximate Gamma UCL	6026		
95% Adjusted Gamma UCL	6166		

Potential UCL to Use		Use 95% Student's-t UCL	5969

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_222	101-09-067	13	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	229	Minimum of Log Data	5.434
Maximum	1390	Maximum of Log Data	7.237
Mean	667.1	Mean of log Data	6.339
Median	639	SD of log Data	0.625
SD	390		
Coefficient of Variation	0.585		
Skewness	0.721		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.939	Shapiro Wilk Test Statistic	0.961
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	908.9	95% H-UCL	1200
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1294
95% Adjusted-CLT UCL	914.3	97.5% Chebyshev (MVUE) UCL	1564
95% Modified-t UCL	914.1	99% Chebyshev (MVUE) UCL	2093

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.213	Data appear Normal at 5% Significance Level	
Theta Star	301.5		
nu star	39.83		
Approximate Chi Square Value (.05)	26.37	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	880.9
Adjusted Chi Square Value	24.08	95% Jackknife UCL	908.9
		95% Standard Bootstrap UCL	870.6
Anderson-Darling Test Statistic	0.182	95% Bootstrap-t UCL	963.5
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	982.6
Kolmogorov-Smirnov Test Statistic	0.128	95% Percentile Bootstrap UCL	879.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	899.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1234
		97.5% Chebyshev(Mean, Sd) UCL	1479
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1961
95% Approximate Gamma UCL	1008		
95% Adjusted Gamma UCL	1103		

Potential UCL to Use		Use 95% Student's-t UCL	908.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_223	101-09-068	13	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	6.8	Minimum of Log Data	1.917
Maximum	33.1	Maximum of Log Data	3.5
Mean	15.87	Mean of log Data	2.66
Median	15	SD of log Data	0.488
SD	7.869		
Coefficient of Variation	0.496		
Skewness	1.272		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Test Statistic	0.948
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	20.74	95% H-UCL	23.88
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	27.29
95% Adjusted-CLT UCL	21.37	97.5% Chebyshev (MVUE) UCL	32.22
95% Modified-t UCL	20.93	99% Chebyshev (MVUE) UCL	41.92
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.375	Data appear Normal at 5% Significance Level	
Theta Star	4.701		
nu star	60.75		
Approximate Chi Square Value (.05)	43.83	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	20.18
Adjusted Chi Square Value	40.81	95% Jackknife UCL	20.74
		95% Standard Bootstrap UCL	19.92
Anderson-Darling Test Statistic	0.304	95% Bootstrap-t UCL	22.48
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	45.58
Kolmogorov-Smirnov Test Statistic	0.169	95% Percentile Bootstrap UCL	20.3
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	21.16
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.3
		97.5% Chebyshev(Mean, Sd) UCL	32.25
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	41.96
95% Approximate Gamma UCL	21.99		
95% Adjusted Gamma UCL	23.62		
Potential UCL to Use		Use 95% Student's-t UCL	20.74

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_224	101-09-068	13	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	826	Minimum of Log Data	6.717
Maximum	5740	Maximum of Log Data	8.655
Mean	3336	Mean of log Data	8.017
Median	3370	SD of log Data	0.53
SD	1278		
Coefficient of Variation	0.383		
Skewness	-0.133		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.893	Shapiro Wilk Test Statistic	0.748
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4128	95% H-UCL	5415
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6109
95% Adjusted-CLT UCL	4017	97.5% Chebyshev (MVUE) UCL	7268
95% Modified-t UCL	4125	99% Chebyshev (MVUE) UCL	9547

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.652	Data appear Normal at 5% Significance Level	
Theta Star	913.5		
nu star	65.74		
Approximate Chi Square Value (.05)	48.08	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4037
Adjusted Chi Square Value	44.91	95% Jackknife UCL	4128
		95% Standard Bootstrap UCL	3996
Anderson-Darling Test Statistic	0.868	95% Bootstrap-t UCL	4066
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	4235
Kolmogorov-Smirnov Test Statistic	0.315	95% Percentile Bootstrap UCL	3986
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	4021
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5193
		97.5% Chebyshev(Mean, Sd) UCL	5996
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7574
95% Approximate Gamma UCL	4561		
95% Adjusted Gamma UCL	4883		

Potential UCL to Use		Use 95% Student's-t UCL	4128

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_225	101-09-068	13	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	35.9	Minimum of Log Data	3.581
Maximum	512	Maximum of Log Data	6.238
Mean	198.7	Mean of log Data	5
Median	161	SD of log Data	0.842
SD	156.7		
Coefficient of Variation	0.788		
Skewness	1.136		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.981
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	295.8	95% H-UCL	508.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	455.6
95% Adjusted-CLT UCL	305.8	97.5% Chebyshev (MVUE) UCL	565.5
95% Modified-t UCL	299.1	99% Chebyshev (MVUE) UCL	781.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.315	Data appear Normal at 5% Significance Level	
Theta Star	151.2		
nu star	23.67		
Approximate Chi Square Value (.05)	13.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	284.6
Adjusted Chi Square Value	12.02	95% Jackknife UCL	295.8
		95% Standard Bootstrap UCL	280.3
Anderson-Darling Test Statistic	0.185	95% Bootstrap-t UCL	367.4
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	385.9
Kolmogorov-Smirnov Test Statistic	0.127	95% Percentile Bootstrap UCL	286.4
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	303.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	426.4
		97.5% Chebyshev(Mean, Sd) UCL	524.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	718.3
95% Approximate Gamma UCL	346		
95% Adjusted Gamma UCL	391.5		

Potential UCL to Use		Use 95% Student's-t UCL	295.8

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_226	101-09-070	13	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	8.3	Minimum of Log Data	2.116
Maximum	32.7	Maximum of Log Data	3.487
Mean	20.57	Mean of log Data	2.932
Median	20.1	SD of log Data	0.477
SD	8.598		
Coefficient of Variation	0.418		
Skewness	0.0142		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	0.921
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	25.9	95% H-UCL	30.83
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	35.32
95% Adjusted-CLT UCL	25.3	97.5% Chebyshev (MVUE) UCL	41.63
95% Modified-t UCL	25.9	99% Chebyshev (MVUE) UCL	54.02
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.81	Data appear Normal at 5% Significance Level	
Theta Star	5.398		
nu star	68.58		
Approximate Chi Square Value (.05)	50.52	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	25.28
Adjusted Chi Square Value	47.27	95% Jackknife UCL	25.9
		95% Standard Bootstrap UCL	25.09
Anderson-Darling Test Statistic	0.289	95% Bootstrap-t UCL	25.99
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	25.34
Kolmogorov-Smirnov Test Statistic	0.154	95% Percentile Bootstrap UCL	25.06
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	25.08
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	33.06
		97.5% Chebyshev(Mean, Sd) UCL	38.47
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	49.08
95% Approximate Gamma UCL	27.92		
95% Adjusted Gamma UCL	29.84		
Potential UCL to Use		Use 95% Student's-t UCL	25.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_227	101-09-070	13	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	2200	Minimum of Log Data	7.696
Maximum	13400	Maximum of Log Data	9.503
Mean	6276	Mean of log Data	8.597
Median	5480	SD of log Data	0.583
SD	3606		
Coefficient of Variation	0.575		
Skewness	0.917		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	8511	95% H-UCL	10617
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11708
95% Adjusted-CLT UCL	8646	97.5% Chebyshev (MVUE) UCL	14055
95% Modified-t UCL	8572	99% Chebyshev (MVUE) UCL	18665
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.434	Data appear Normal at 5% Significance Level	
Theta Star	2579		
nu star	43.81		
Approximate Chi Square Value (.05)	29.63	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	8253
Adjusted Chi Square Value	27.19	95% Jackknife UCL	8511
		95% Standard Bootstrap UCL	8182
Anderson-Darling Test Statistic	0.26	95% Bootstrap-t UCL	9283
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	8764
Kolmogorov-Smirnov Test Statistic	0.194	95% Percentile Bootstrap UCL	8170
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	8412
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	11516
		97.5% Chebyshev(Mean, Sd) UCL	13783
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	18237
95% Approximate Gamma UCL	9279		
95% Adjusted Gamma UCL	10110		
Potential UCL to Use		Use 95% Student's-t UCL	8511

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_228	101-09-070	13	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	163	Minimum of Log Data	5.094
Maximum	4860	Maximum of Log Data	8.489
Mean	832.1	Mean of log Data	6.035
Median	306	SD of log Data	0.99
SD	1515		
Coefficient of Variation	1.821		
Skewness	2.964		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.462	Shapiro Wilk Test Statistic	0.734
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1771	95% H-UCL	2147
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1580
95% Adjusted-CLT UCL	2196	97.5% Chebyshev (MVUE) UCL	1989
95% Modified-t UCL	1855	99% Chebyshev (MVUE) UCL	2793

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.644	Data do not follow a Discernable Distribution (0.05)	
Theta Star	1293		
nu star	11.59		
Approximate Chi Square Value (.05)	4.957	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	1663
Adjusted Chi Square Value	4.081	95% Jackknife UCL	1771
		95% Standard Bootstrap UCL	1592
Anderson-Darling Test Statistic	1.663	95% Bootstrap-t UCL	9423
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	7113
Kolmogorov-Smirnov Test Statistic	0.394	95% Percentile Bootstrap UCL	1819
Kolmogorov-Smirnov 5% Critical Value	0.288	95% BCA Bootstrap UCL	2305
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3034
		97.5% Chebyshev(Mean, Sd) UCL	3986
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	5858
95% Approximate Gamma UCL	1945		
95% Adjusted Gamma UCL	2363		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	3034

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_229	101-09-072	13	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	7.2	Minimum of Log Data	1.974
Maximum	34.8	Maximum of Log Data	3.55
Mean	23.52	Mean of log Data	3.07
Median	23.8	SD of log Data	0.492
SD	8.823		
Coefficient of Variation	0.375		
Skewness	-0.671		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.948	Shapiro Wilk Test Statistic	0.85
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	28.99	95% H-UCL	36.17
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	41.3
95% Adjusted-CLT UCL	27.66	97.5% Chebyshev (MVUE) UCL	48.8
95% Modified-t UCL	28.88	99% Chebyshev (MVUE) UCL	63.55

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.961	Data appear Normal at 5% Significance Level	
Theta Star	5.939		
nu star	71.3		
Approximate Chi Square Value (.05)	52.86	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	28.36
Adjusted Chi Square Value	49.52	95% Jackknife UCL	28.99
		95% Standard Bootstrap UCL	28.17
Anderson-Darling Test Statistic	0.458	95% Bootstrap-t UCL	28.39
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	27.72
Kolmogorov-Smirnov Test Statistic	0.221	95% Percentile Bootstrap UCL	28.06
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	27.56
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	36.34
		97.5% Chebyshev(Mean, Sd) UCL	41.89
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	52.79
95% Approximate Gamma UCL	31.73		
95% Adjusted Gamma UCL	33.86		

Potential UCL to Use	Use 95% Student's-t UCL	28.99

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_230	101-09-072	13	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3550	Minimum of Log Data	8.175
Maximum	11800	Maximum of Log Data	9.376
Mean	6846	Mean of log Data	8.772
Median	5950	SD of log Data	0.366
SD	2556		
Coefficient of Variation	0.373		
Skewness	0.894		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.936	Shapiro Wilk Test Statistic	0.981
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	8430	95% H-UCL	9055
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10507
95% Adjusted-CLT UCL	8519	97.5% Chebyshev (MVUE) UCL	12092
95% Modified-t UCL	8472	99% Chebyshev (MVUE) UCL	15207

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.77	Data appear Normal at 5% Significance Level	
Theta Star	1186		
nu star	103.9		
Approximate Chi Square Value (.05)	81.34	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	8247
Adjusted Chi Square Value	77.15	95% Jackknife UCL	8430
		95% Standard Bootstrap UCL	8170
Anderson-Darling Test Statistic	0.218	95% Bootstrap-t UCL	9169
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	10079
Kolmogorov-Smirnov Test Statistic	0.168	95% Percentile Bootstrap UCL	8206
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	8353
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	10560
		97.5% Chebyshev(Mean, Sd) UCL	12167
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15324
95% Approximate Gamma UCL	8740		
95% Adjusted Gamma UCL	9216		

Potential UCL to Use		Use 95% Student's-t UCL	8430

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_231	101-09-072	13	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	62.5	Minimum of Log Data	4.135
Maximum	1030	Maximum of Log Data	6.937
Mean	280	Mean of log Data	5.275
Median	164	SD of log Data	0.864
SD	296.8		
Coefficient of Variation	1.06		
Skewness	2.432		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.683	Shapiro Wilk Test Statistic	0.933
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	464	95% H-UCL	709.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	618.8
95% Adjusted-CLT UCL	528.5	97.5% Chebyshev (MVUE) UCL	769.9
95% Modified-t UCL	477.4	99% Chebyshev (MVUE) UCL	1067

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.098	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	255		
nu star	19.77		
Approximate Chi Square Value (.05)	10.68	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	442.8
Adjusted Chi Square Value	9.305	95% Jackknife UCL	464
		95% Standard Bootstrap UCL	434.7
Anderson-Darling Test Statistic	0.494	95% Bootstrap-t UCL	713.2
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	1065
Kolmogorov-Smirnov Test Statistic	0.222	95% Percentile Bootstrap UCL	448.8
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL	552
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	711.3
		97.5% Chebyshev(Mean, Sd) UCL	897.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1264
95% Approximate Gamma UCL	518.3		
95% Adjusted Gamma UCL	595		

Potential UCL to Use		Use 95% Approximate Gamma UCL	518.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_232	101-09-036	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	14.2	Minimum of Log Data	2.653
Maximum	49.3	Maximum of Log Data	3.898
Mean	23.93	Mean of log Data	3.091
Median	19.6	SD of log Data	0.418
SD	11.51		
Coefficient of Variation	0.481		
Skewness	1.584		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.819	Shapiro Wilk Test Statistic	0.905
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	31.07	95% H-UCL	33.09
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	38.31
95% Adjusted-CLT UCL	32.41	97.5% Chebyshev (MVUE) UCL	44.61
95% Modified-t UCL	31.4	99% Chebyshev (MVUE) UCL	56.99

Gamma Distribution Test		Data Distribution
k star (bias corrected)	4.116	Data appear Gamma Distributed at 5% Significance Level
Theta Star	5.815	
nu star	74.08	
Approximate Chi Square Value (.05)	55.26	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 30.24
Adjusted Chi Square Value	51.85	95% Jackknife UCL 31.07
		95% Standard Bootstrap UCL 29.69
Anderson-Darling Test Statistic	0.502	95% Bootstrap-t UCL 38.15
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL 57.19
Kolmogorov-Smirnov Test Statistic	0.255	95% Percentile Bootstrap UCL 30.43
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 32.21
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 40.65
		97.5% Chebyshev(Mean, Sd) UCL 47.89
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 62.1
95% Approximate Gamma UCL	32.09	
95% Adjusted Gamma UCL	34.2	

Potential UCL to Use		Use 95% Approximate Gamma UCL	32.09

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_233	101-09-036	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1670	Minimum of Log Data	7.421
Maximum	9680	Maximum of Log Data	9.178
Mean	5226	Mean of log Data	8.408
Median	4710	SD of log Data	0.613
SD	2854		
Coefficient of Variation	0.546		
Skewness	0.354		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.932	Shapiro Wilk Test Statistic	0.943
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6995	95% H-UCL	9291
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10087
95% Adjusted-CLT UCL	6910	97.5% Chebyshev (MVUE) UCL	12166
95% Modified-t UCL	7013	99% Chebyshev (MVUE) UCL	16248

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.354	Data appear Normal at 5% Significance Level	
Theta Star	2220		
nu star	42.37		
Approximate Chi Square Value (.05)	28.45	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6790
Adjusted Chi Square Value	26.07	95% Jackknife UCL	6995
		95% Standard Bootstrap UCL	6708
Anderson-Darling Test Statistic	0.264	95% Bootstrap-t UCL	7316
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	6793
Kolmogorov-Smirnov Test Statistic	0.172	95% Percentile Bootstrap UCL	6639
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	6737
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9372
		97.5% Chebyshev(Mean, Sd) UCL	11167
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	14691
95% Approximate Gamma UCL	7783		
95% Adjusted Gamma UCL	8495		

Potential UCL to Use		Use 95% Student's-t UCL	6995

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_234	101-09-036	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	84.1	Minimum of Log Data	4.432
Maximum	3710	Maximum of Log Data	8.219
Mean	1147	Mean of log Data	6.569
Median	734	SD of log Data	1.106
SD	1190		
Coefficient of Variation	1.038		
Skewness	1.65		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.772	Shapiro Wilk Test Statistic	0.942
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1885	95% H-UCL	5258
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3188
95% Adjusted-CLT UCL	2033	97.5% Chebyshev (MVUE) UCL	4051
95% Modified-t UCL	1921	99% Chebyshev (MVUE) UCL	5744

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.868	Data appear Gamma Distributed at 5% Significance Level
Theta Star	1322	
nu star	15.62	
Approximate Chi Square Value (.05)	7.693	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 1800
Adjusted Chi Square Value	6.555	95% Jackknife UCL 1885
		95% Standard Bootstrap UCL 1780
Anderson-Darling Test Statistic	0.405	95% Bootstrap-t UCL 3651
Anderson-Darling 5% Critical Value	0.74	95% Hall's Bootstrap UCL 6598
Kolmogorov-Smirnov Test Statistic	0.25	95% Percentile Bootstrap UCL 1851
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL 2028
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 2877
		97.5% Chebyshev(Mean, Sd) UCL 3625
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 5095
95% Approximate Gamma UCL	2329	
95% Adjusted Gamma UCL	2733	

Potential UCL to Use	Use 95% Approximate Gamma UCL	2329

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_235	101-09-038	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	11.7	Minimum of Log Data	2.46
Maximum	116	Maximum of Log Data	4.754
Mean	56.84	Mean of log Data	3.82
Median	47.3	SD of log Data	0.761
SD	35.33		
Coefficient of Variation	0.622		
Skewness	0.365		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Test Statistic	0.942
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	78.74	95% H-UCL	128.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	125.2
95% Adjusted-CLT UCL	77.75	97.5% Chebyshev (MVUE) UCL	154
95% Modified-t UCL	78.98	99% Chebyshev (MVUE) UCL	210.5
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.692	Data appear Normal at 5% Significance Level	
Theta Star	33.61		
nu star	30.45		
Approximate Chi Square Value (.05)	18.84	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	76.21
Adjusted Chi Square Value	16.95	95% Jackknife UCL	78.74
		95% Standard Bootstrap UCL	75.91
Anderson-Darling Test Statistic	0.237	95% Bootstrap-t UCL	79.87
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	75.78
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	75.98
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	76.24
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	108.2
		97.5% Chebyshev(Mean, Sd) UCL	130.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	174
95% Approximate Gamma UCL	91.84		
95% Adjusted Gamma UCL	102.1		
Potential UCL to Use		Use 95% Student's-t UCL	78.74

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_236	101-09-038	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	856	Minimum of Log Data	6.752
Maximum	17200	Maximum of Log Data	9.753
Mean	10633	Mean of log Data	8.964
Median	12000	SD of log Data	1.045
SD	5837		
Coefficient of Variation	0.549		
Skewness	-0.8		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.897	Shapiro Wilk Test Statistic	0.744
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	14251	95% H-UCL	47492
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	32007
95% Adjusted-CLT UCL	13279	97.5% Chebyshev (MVUE) UCL	40477
95% Modified-t UCL	14164	99% Chebyshev (MVUE) UCL	57114

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.257	Data appear Normal at 5% Significance Level
Theta Star	8460	
nu star	22.62	
Approximate Chi Square Value (.05)	12.81	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 13833
Adjusted Chi Square Value	11.28	95% Jackknife UCL 14251
		95% Standard Bootstrap UCL 13699
Anderson-Darling Test Statistic	0.913	95% Bootstrap-t UCL 13687
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL 13241
Kolmogorov-Smirnov Test Statistic	0.323	95% Percentile Bootstrap UCL 13578
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL 13367
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 19113
		97.5% Chebyshev(Mean, Sd) UCL 22783
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 29991
95% Approximate Gamma UCL	18783	
95% Adjusted Gamma UCL	21326	

Potential UCL to Use		Use 95% Student's-t UCL	14251

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_237	101-09-038	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	30.2	Minimum of Log Data	3.408
Maximum	557	Maximum of Log Data	6.323
Mean	317.8	Mean of log Data	5.531
Median	320	SD of log Data	0.887
SD	167.3		
Coefficient of Variation	0.526		
Skewness	-0.295		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.971	Shapiro Wilk Test Statistic	0.79
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	421.5	95% H-UCL	972.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	824.8
95% Adjusted-CLT UCL	403.7	97.5% Chebyshev (MVUE) UCL	1029
95% Modified-t UCL	420.6	99% Chebyshev (MVUE) UCL	1429

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.621	Data appear Normal at 5% Significance Level	
Theta Star	196		
nu star	29.18		
Approximate Chi Square Value (.05)	17.85	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	409.5
Adjusted Chi Square Value	16.01	95% Jackknife UCL	421.5
		95% Standard Bootstrap UCL	403.9
Anderson-Darling Test Statistic	0.484	95% Bootstrap-t UCL	416.5
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	403.2
Kolmogorov-Smirnov Test Statistic	0.175	95% Percentile Bootstrap UCL	403.2
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	403.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	560.8
		97.5% Chebyshev(Mean, Sd) UCL	666
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	872.5
95% Approximate Gamma UCL	519.5		
95% Adjusted Gamma UCL	579.3		

Potential UCL to Use		Use 95% Student's-t UCL	421.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_238	101-09-039	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	6	Minimum of Log Data	1.792
Maximum	32.5	Maximum of Log Data	3.481
Mean	16.24	Mean of log Data	2.619
Median	16.2	SD of log Data	0.626
SD	9.774		
Coefficient of Variation	0.602		
Skewness	0.707		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.89	Shapiro Wilk Test Statistic	0.927
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	22.3	95% H-UCL	29.12
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	31.39
95% Adjusted-CLT UCL	22.42	97.5% Chebyshev (MVUE) UCL	37.93
95% Modified-t UCL	22.43	99% Chebyshev (MVUE) UCL	50.77

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.155	Data appear Normal at 5% Significance Level	
Theta Star	7.537		
nu star	38.79		
Approximate Chi Square Value (.05)	25.53	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	21.6
Adjusted Chi Square Value	23.28	95% Jackknife UCL	22.3
		95% Standard Bootstrap UCL	21.31
Anderson-Darling Test Statistic	0.341	95% Bootstrap-t UCL	24.1
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	24.66
Kolmogorov-Smirnov Test Statistic	0.173	95% Percentile Bootstrap UCL	21.33
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	21.71
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	30.45
		97.5% Chebyshev(Mean, Sd) UCL	36.59
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	48.66
95% Approximate Gamma UCL	24.69		
95% Adjusted Gamma UCL	27.07		

Potential UCL to Use	Use 95% Student's-t UCL	22.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_239	101-09-039	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1250	Minimum of Log Data	7.131
Maximum	12600	Maximum of Log Data	9.441
Mean	4682	Mean of log Data	8.199
Median	4120	SD of log Data	0.768
SD	3567		
Coefficient of Variation	0.762		
Skewness	1.459		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.867	Shapiro Wilk Test Statistic	0.962
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6893	95% H-UCL	10438
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10091
95% Adjusted-CLT UCL	7256	97.5% Chebyshev (MVUE) UCL	12423
95% Modified-t UCL	6990	99% Chebyshev (MVUE) UCL	17005

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.498	Data appear Normal at 5% Significance Level	
Theta Star	3126		
nu star	26.96		
Approximate Chi Square Value (.05)	16.12	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6638
Adjusted Chi Square Value	14.38	95% Jackknife UCL	6893
		95% Standard Bootstrap UCL	6514
Anderson-Darling Test Statistic	0.213	95% Bootstrap-t UCL	8054
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	15891
Kolmogorov-Smirnov Test Statistic	0.119	95% Percentile Bootstrap UCL	6649
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	7196
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9865
		97.5% Chebyshev(Mean, Sd) UCL	12107
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	16512
95% Approximate Gamma UCL	7831		
95% Adjusted Gamma UCL	8778		

Potential UCL to Use		Use 95% Student's-t UCL	6893

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_240	101-09-039	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	35.9	Minimum of Log Data	3.581
Maximum	5210	Maximum of Log Data	8.558
Mean	737.3	Mean of log Data	5.249
Median	176	SD of log Data	1.517
SD	1683		
Coefficient of Variation	2.283		
Skewness	2.962		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.463	Shapiro Wilk Test Statistic	0.894
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1780	95% H-UCL	6987
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1589
95% Adjusted-CLT UCL	2252	97.5% Chebyshev (MVUE) UCL	2067
95% Modified-t UCL	1873	99% Chebyshev (MVUE) UCL	3005

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.389	Data appear Lognormal at 5% Significance Level	
Theta Star	1893		
nu star	7.01		
Approximate Chi Square Value (.05)	2.176	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	1660
Adjusted Chi Square Value	1.654	95% Jackknife UCL	1780
		95% Standard Bootstrap UCL	1616
Anderson-Darling Test Statistic	1.099	95% Bootstrap-t UCL	11003
Anderson-Darling 5% Critical Value	0.776	95% Hall's Bootstrap UCL	7030
Kolmogorov-Smirnov Test Statistic	0.314	95% Percentile Bootstrap UCL	1849
Kolmogorov-Smirnov 5% Critical Value	0.295	95% BCA Bootstrap UCL	2413
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3183
		97.5% Chebyshev(Mean, Sd) UCL	4241
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6319
95% Approximate Gamma UCL	2375		
95% Adjusted Gamma UCL	3125		

Potential UCL to Use	Use 99% Chebyshev (MVUE) UCL	3005

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_241	101-09-042	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	9.7	Minimum of Log Data	2.272
Maximum	26	Maximum of Log Data	3.258
Mean	14.68	Mean of log Data	2.646
Median	13.3	SD of log Data	0.288
SD	4.82		
Coefficient of Variation	0.328		
Skewness	1.813		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.834	Shapiro Wilk Test Statistic	0.935
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	17.67	95% H-UCL	18.04
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	20.79
95% Adjusted-CLT UCL	18.36	97.5% Chebyshev (MVUE) UCL	23.45
95% Modified-t UCL	17.83	99% Chebyshev (MVUE) UCL	28.68

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	8.525	Data appear Normal at 5% Significance Level	
Theta Star	1.722		
nu star	153.5		
Approximate Chi Square Value (.05)	125.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	17.32
Adjusted Chi Square Value	120.5	95% Jackknife UCL	17.67
		95% Standard Bootstrap UCL	17.16
Anderson-Darling Test Statistic	0.385	95% Bootstrap-t UCL	19.68
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	29.13
Kolmogorov-Smirnov Test Statistic	0.161	95% Percentile Bootstrap UCL	17.42
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	18.09
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	21.68
		97.5% Chebyshev(Mean, Sd) UCL	24.71
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	30.66
95% Approximate Gamma UCL	17.9		
95% Adjusted Gamma UCL	18.69		

Potential UCL to Use		Use 95% Student's-t UCL	17.67

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_242	101-09-042	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3000	Minimum of Log Data	8.006
Maximum	7110	Maximum of Log Data	8.869
Mean	4074	Mean of log Data	8.273
Median	3450	SD of log Data	0.283
SD	1346		
Coefficient of Variation	0.33		
Skewness	1.801		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.764	Shapiro Wilk Test Statistic	0.831
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4909	95% H-UCL	4985
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5738
95% Adjusted-CLT UCL	5100	97.5% Chebyshev (MVUE) UCL	6465
95% Modified-t UCL	4953	99% Chebyshev (MVUE) UCL	7893

Gamma Distribution Test		Data Distribution
k star (bias corrected)	8.621	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	472.6	
nu star	155.2	
Approximate Chi Square Value (.05)	127.4	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 4812
Adjusted Chi Square Value	122.1	95% Jackknife UCL 4909
		95% Standard Bootstrap UCL 4781
Anderson-Darling Test Statistic	0.818	95% Bootstrap-t UCL 6542
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL 8454
Kolmogorov-Smirnov Test Statistic	0.264	95% Percentile Bootstrap UCL 4793
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL 5016
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 6030
		97.5% Chebyshev(Mean, Sd) UCL 6876
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 8537
95% Approximate Gamma UCL	4964	
95% Adjusted Gamma UCL	5179	

Potential UCL to Use		Use 95% Approximate Gamma UCL	4964

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_243	101-09-042	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	228	Minimum of Log Data	5.429
Maximum	491	Maximum of Log Data	6.196
Mean	346.9	Mean of log Data	5.823
Median	323	SD of log Data	0.241
SD	83.18		
Coefficient of Variation	0.24		
Skewness	0.386		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.97	Shapiro Wilk Test Statistic	0.98
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	398.4	95% H-UCL	411.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	468.9
95% Adjusted-CLT UCL	396.3	97.5% Chebyshev (MVUE) UCL	521.6
95% Modified-t UCL	399	99% Chebyshev (MVUE) UCL	625.3

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	13.18	Data appear Normal at 5% Significance Level	
Theta Star	26.32		
nu star	237.2		
Approximate Chi Square Value (.05)	202.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	392.5
Adjusted Chi Square Value	195.8	95% Jackknife UCL	398.4
		95% Standard Bootstrap UCL	389.4
Anderson-Darling Test Statistic	0.193	95% Bootstrap-t UCL	404.3
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	398.4
Kolmogorov-Smirnov Test Statistic	0.149	95% Percentile Bootstrap UCL	389.1
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	394.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	467.7
		97.5% Chebyshev(Mean, Sd) UCL	520
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	622.8
95% Approximate Gamma UCL	406.2		
95% Adjusted Gamma UCL	420.3		

Potential UCL to Use		Use 95% Student's-t UCL	398.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_244	101-09-045	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5	Minimum of Log Data	1.609
Maximum	31.5	Maximum of Log Data	3.45
Mean	17.82	Mean of log Data	2.776
Median	16.5	SD of log Data	0.527
SD	7.727		
Coefficient of Variation	0.434		
Skewness	0.269		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.979	Shapiro Wilk Test Statistic	0.905
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	22.61	95% H-UCL	28.56
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	32.24
95% Adjusted-CLT UCL	22.31	97.5% Chebyshev (MVUE) UCL	38.35
95% Modified-t UCL	22.65	99% Chebyshev (MVUE) UCL	50.34

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.371	Data appear Normal at 5% Significance Level	
Theta Star	5.286		
nu star	60.68		
Approximate Chi Square Value (.05)	43.77	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	22.06
Adjusted Chi Square Value	40.76	95% Jackknife UCL	22.61
		95% Standard Bootstrap UCL	21.94
Anderson-Darling Test Statistic	0.265	95% Bootstrap-t UCL	23.4
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	24.4
Kolmogorov-Smirnov Test Statistic	0.166	95% Percentile Bootstrap UCL	21.96
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	22.07
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	29.05
		97.5% Chebyshev(Mean, Sd) UCL	33.91
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	43.45
95% Approximate Gamma UCL	24.71		
95% Adjusted Gamma UCL	26.54		

Potential UCL to Use		Use 95% Student's-t UCL	22.61

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_245	101-09-045	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1280	Minimum of Log Data	7.155
Maximum	6360	Maximum of Log Data	8.758
Mean	4046	Mean of log Data	8.218
Median	4430	SD of log Data	0.484
SD	1561		
Coefficient of Variation	0.386		
Skewness	-0.332		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.979	Shapiro Wilk Test Statistic	0.889
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5013	95% H-UCL	6153
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7039
95% Adjusted-CLT UCL	4840	97.5% Chebyshev (MVUE) UCL	8306
95% Modified-t UCL	5004	99% Chebyshev (MVUE) UCL	10797

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.98	Data appear Normal at 5% Significance Level	
Theta Star	1016		
nu star	71.65		
Approximate Chi Square Value (.05)	53.16	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4902
Adjusted Chi Square Value	49.82	95% Jackknife UCL	5013
		95% Standard Bootstrap UCL	4844
Anderson-Darling Test Statistic	0.324	95% Bootstrap-t UCL	4960
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	4866
Kolmogorov-Smirnov Test Statistic	0.196	95% Percentile Bootstrap UCL	4832
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	4790
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6314
		97.5% Chebyshev(Mean, Sd) UCL	7295
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9223
95% Approximate Gamma UCL	5453		
95% Adjusted Gamma UCL	5819		

Potential UCL to Use		Use 95% Student's-t UCL	5013

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_246	101-09-045	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	31.1	Minimum of Log Data	3.437
Maximum	192	Maximum of Log Data	5.257
Mean	110	Mean of log Data	4.611
Median	114	SD of log Data	0.499
SD	42.67		
Coefficient of Variation	0.388		
Skewness	0.0782		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.926	Shapiro Wilk Test Statistic	0.819
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	136.5	95% H-UCL	170.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	194.7
95% Adjusted-CLT UCL	133.8	97.5% Chebyshev (MVUE) UCL	230.4
95% Modified-t UCL	136.5	99% Chebyshev (MVUE) UCL	300.5
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.891	Data appear Normal at 5% Significance Level	
Theta Star	28.28		
nu star	70.03		
Approximate Chi Square Value (.05)	51.77	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	133.4
Adjusted Chi Square Value	48.47	95% Jackknife UCL	136.5
		95% Standard Bootstrap UCL	131.9
Anderson-Darling Test Statistic	0.629	95% Bootstrap-t UCL	135.2
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	141.1
Kolmogorov-Smirnov Test Statistic	0.243	95% Percentile Bootstrap UCL	131.8
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	133.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	172
		97.5% Chebyshev(Mean, Sd) UCL	198.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	251.5
95% Approximate Gamma UCL	148.8		
95% Adjusted Gamma UCL	159		
Potential UCL to Use		Use 95% Student's-t UCL	136.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_247	101-09-047	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	12.1	Minimum of Log Data	2.493
Maximum	28.5	Maximum of Log Data	3.35
Mean	18.67	Mean of log Data	2.885
Median	17.9	SD of log Data	0.306
SD	5.76		
Coefficient of Variation	0.309		
Skewness	0.554		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.938	Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	22.24	95% H-UCL	23.38
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	27.01
95% Adjusted-CLT UCL	22.2	97.5% Chebyshev (MVUE) UCL	30.62
95% Modified-t UCL	22.3	99% Chebyshev (MVUE) UCL	37.72
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	8.167	Data appear Normal at 5% Significance Level	
Theta Star	2.286		
nu star	147		
Approximate Chi Square Value (.05)	120	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	21.82
Adjusted Chi Square Value	114.8	95% Jackknife UCL	22.24
		95% Standard Bootstrap UCL	21.66
Anderson-Darling Test Statistic	0.221	95% Bootstrap-t UCL	22.91
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	22.86
Kolmogorov-Smirnov Test Statistic	0.125	95% Percentile Bootstrap UCL	21.76
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	21.97
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.04
		97.5% Chebyshev(Mean, Sd) UCL	30.66
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	37.77
95% Approximate Gamma UCL	22.87		
95% Adjusted Gamma UCL	23.9		
Potential UCL to Use		Use 95% Student's-t UCL	22.24

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_248	101-09-047	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	3170	Minimum of Log Data	8.061
Maximum	12400	Maximum of Log Data	9.425
Mean	5261	Mean of log Data	8.46
Median	3900	SD of log Data	0.459
SD	3003		
Coefficient of Variation	0.571		
Skewness	2.009		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.729	Shapiro Wilk Test Statistic	0.829
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	7122	95% H-UCL	7543
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8678
95% Adjusted-CLT UCL	7623	97.5% Chebyshev (MVUE) UCL	10190
95% Modified-t UCL	7234	99% Chebyshev (MVUE) UCL	13162

Gamma Distribution Test		Data Distribution
k star (bias corrected)	3.276	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	1606	
nu star	58.96	
Approximate Chi Square Value (.05)	42.31	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 6907
Adjusted Chi Square Value	39.35	95% Jackknife UCL 7122
		95% Standard Bootstrap UCL 6794
Anderson-Darling Test Statistic	0.81	95% Bootstrap-t UCL 9152
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL 12077
Kolmogorov-Smirnov Test Statistic	0.259	95% Percentile Bootstrap UCL 7032
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 7543
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 9624
		97.5% Chebyshev(Mean, Sd) UCL 11512
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 15220
95% Approximate Gamma UCL	7332	
95% Adjusted Gamma UCL	7883	

Potential UCL to Use		Use 95% Approximate Gamma UCL	7332

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_249	101-09-047	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	222	Minimum of Log Data	5.403
Maximum	1170	Maximum of Log Data	7.065
Mean	606	Mean of log Data	6.203
Median	368	SD of log Data	0.68
SD	401.4		
Coefficient of Variation	0.662		
Skewness	0.599		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.808	Shapiro Wilk Test Statistic	0.865
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	854.8	95% H-UCL	1168
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1216
95% Adjusted-CLT UCL	854.6	97.5% Chebyshev (MVUE) UCL	1480
95% Modified-t UCL	859.2	99% Chebyshev (MVUE) UCL	2000

Gamma Distribution Test		Data Distribution
k star (bias corrected)	1.814	Data appear Gamma Distributed at 5% Significance Level
Theta Star	334	
nu star	32.65	
Approximate Chi Square Value (.05)	20.59	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 826.1
Adjusted Chi Square Value	18.6	95% Jackknife UCL 854.8
		95% Standard Bootstrap UCL 811.1
Anderson-Darling Test Statistic	0.659	95% Bootstrap-t UCL 888.2
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL 765.9
Kolmogorov-Smirnov Test Statistic	0.257	95% Percentile Bootstrap UCL 821.3
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL 840.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 1189
		97.5% Chebyshev(Mean, Sd) UCL 1442
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 1937
95% Approximate Gamma UCL	961	
95% Adjusted Gamma UCL	1064	

Potential UCL to Use		Use 95% Approximate Gamma UCL	961

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_250	101-09-054	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	12.6	Minimum of Log Data	2.534
Maximum	29.9	Maximum of Log Data	3.398
Mean	21.86	Mean of log Data	3.047
Median	20.9	SD of log Data	0.294
SD	6.114		
Coefficient of Variation	0.28		
Skewness	0.0198		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.949	Shapiro Wilk Test Statistic	0.95
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	25.65	95% H-UCL	27.14
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	31.29
95% Adjusted-CLT UCL	25.22	97.5% Chebyshev (MVUE) UCL	35.36
95% Modified-t UCL	25.65	99% Chebyshev (MVUE) UCL	43.36

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	9.172	Data appear Normal at 5% Significance Level	
Theta Star	2.383		
nu star	165.1		
Approximate Chi Square Value (.05)	136.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	25.21
Adjusted Chi Square Value	130.9	95% Jackknife UCL	25.65
		95% Standard Bootstrap UCL	25.01
Anderson-Darling Test Statistic	0.225	95% Bootstrap-t UCL	25.69
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	24.91
Kolmogorov-Smirnov Test Statistic	0.153	95% Percentile Bootstrap UCL	24.99
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	25.06
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	30.74
		97.5% Chebyshev(Mean, Sd) UCL	34.58
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	42.13
95% Approximate Gamma UCL	26.46		
95% Adjusted Gamma UCL	27.57		

Potential UCL to Use		Use 95% Student's-t UCL	25.65

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_251	101-09-054	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3070	Minimum of Log Data	8.029
Maximum	8880	Maximum of Log Data	9.092
Mean	5943	Mean of log Data	8.604
Median	5890	SD of log Data	0.449
SD	2480		
Coefficient of Variation	0.417		
Skewness	0.0124		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.844	Shapiro Wilk Test Statistic	0.847
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	7480	95% H-UCL	8586
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9896
95% Adjusted-CLT UCL	7307	97.5% Chebyshev (MVUE) UCL	11598
95% Modified-t UCL	7481	99% Chebyshev (MVUE) UCL	14942

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.073	Data appear Normal at 5% Significance Level	
Theta Star	1459		
nu star	73.32		
Approximate Chi Square Value (.05)	54.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	7303
Adjusted Chi Square Value	51.21	95% Jackknife UCL	7480
		95% Standard Bootstrap UCL	7255
Anderson-Darling Test Statistic	0.662	95% Bootstrap-t UCL	7492
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	6985
Kolmogorov-Smirnov Test Statistic	0.246	95% Percentile Bootstrap UCL	7296
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	7214
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9546
		97.5% Chebyshev(Mean, Sd) UCL	11105
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	14168
95% Approximate Gamma UCL	7981		
95% Adjusted Gamma UCL	8509		

Potential UCL to Use		Use 95% Student's-t UCL	7480

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_252	101-09-054	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	124	Minimum of Log Data	4.82
Maximum	783	Maximum of Log Data	6.663
Mean	550.8	Mean of log Data	6.207
Median	617	SD of log Data	0.565
SD	202.7		
Coefficient of Variation	0.368		
Skewness	-1.186		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.913	Shapiro Wilk Test Statistic	0.741
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	676.4	95% H-UCL	942.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1048
95% Adjusted-CLT UCL	633.4	97.5% Chebyshev (MVUE) UCL	1255
95% Modified-t UCL	672	99% Chebyshev (MVUE) UCL	1660
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.379	Data appear Normal at 5% Significance Level	
Theta Star	163		
nu star	60.82		
Approximate Chi Square Value (.05)	43.89	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	661.9
Adjusted Chi Square Value	40.87	95% Jackknife UCL	676.4
		95% Standard Bootstrap UCL	655.9
Anderson-Darling Test Statistic	0.757	95% Bootstrap-t UCL	650.1
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	637.8
Kolmogorov-Smirnov Test Statistic	0.225	95% Percentile Bootstrap UCL	646.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	640.7
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	845.3
		97.5% Chebyshev(Mean, Sd) UCL	972.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1223
95% Approximate Gamma UCL	763.3		
95% Adjusted Gamma UCL	819.7		
Potential UCL to Use		Use 95% Student's-t UCL	676.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_253	101-09-077	14	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	19.4	Minimum of Log Data	2.965
Maximum	66.3	Maximum of Log Data	4.194
Mean	35.5	Mean of log Data	3.481
Median	33.1	SD of log Data	0.439
SD	16.51		
Coefficient of Variation	0.465		
Skewness	1.005		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.87	Shapiro Wilk Test Statistic	0.919
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	45.74	95% H-UCL	50.39
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	58.17
95% Adjusted-CLT UCL	46.52	97.5% Chebyshev (MVUE) UCL	68.04
95% Modified-t UCL	46.04	99% Chebyshev (MVUE) UCL	87.43

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.939	Data appear Normal at 5% Significance Level	
Theta Star	9.013		
nu star	70.9		
Approximate Chi Square Value (.05)	52.52	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	44.55
Adjusted Chi Square Value	49.19	95% Jackknife UCL	45.74
		95% Standard Bootstrap UCL	44.02
Anderson-Darling Test Statistic	0.418	95% Bootstrap-t UCL	52.35
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	56.42
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL	44.42
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	46.37
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	59.49
		97.5% Chebyshev(Mean, Sd) UCL	69.87
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	90.27
95% Approximate Gamma UCL	47.93		
95% Adjusted Gamma UCL	51.17		

Potential UCL to Use		Use 95% Student's-t UCL	45.74

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_254	101-09-077	14	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4130	Minimum of Log Data	8.326
Maximum	8110	Maximum of Log Data	9.001
Mean	5633	Mean of log Data	8.607
Median	4840	SD of log Data	0.254
SD	1480		
Coefficient of Variation	0.263		
Skewness	0.638		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.866	Shapiro Wilk Test Statistic	0.876
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	6551	95% H-UCL	6748
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7718
95% Adjusted-CLT UCL	6557	97.5% Chebyshev (MVUE) UCL	8622
95% Modified-t UCL	6568	99% Chebyshev (MVUE) UCL	10397

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	11.52	Data appear Normal at 5% Significance Level	
Theta Star	489		
nu star	207.3		
Approximate Chi Square Value (.05)	175	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6445
Adjusted Chi Square Value	168.8	95% Jackknife UCL	6551
		95% Standard Bootstrap UCL	6389
Anderson-Darling Test Statistic	0.607	95% Bootstrap-t UCL	6795
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	6358
Kolmogorov-Smirnov Test Statistic	0.258	95% Percentile Bootstrap UCL	6439
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6522
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7784
		97.5% Chebyshev(Mean, Sd) UCL	8715
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10543
95% Approximate Gamma UCL	6674		
95% Adjusted Gamma UCL	6921		

Potential UCL to Use		Use 95% Student's-t UCL	6551

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_255	101-09-077	14	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	211	Minimum of Log Data	5.352
Maximum	7250	Maximum of Log Data	8.889
Mean	1263	Mean of log Data	6.273
Median	324	SD of log Data	1.195
SD	2302		
Coefficient of Variation	1.823		
Skewness	2.75		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.532	Shapiro Wilk Test Statistic	0.788
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2690	95% H-UCL	5312
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2705
95% Adjusted-CLT UCL	3277	97.5% Chebyshev (MVUE) UCL	3458
95% Modified-t UCL	2807	99% Chebyshev (MVUE) UCL	4937

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.538	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2346		
nu star	9.689		
Approximate Chi Square Value (.05)	3.748	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2525
Adjusted Chi Square Value	3.01	95% Jackknife UCL	2690
		95% Standard Bootstrap UCL	2475
Anderson-Darling Test Statistic	1.265	95% Bootstrap-t UCL	17995
Anderson-Darling 5% Critical Value	0.756	95% Hall's Bootstrap UCL	10830
Kolmogorov-Smirnov Test Statistic	0.36	95% Percentile Bootstrap UCL	2639
Kolmogorov-Smirnov 5% Critical Value	0.29	95% BCA Bootstrap UCL	3450
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4608
		97.5% Chebyshev(Mean, Sd) UCL	6055
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	8897
95% Approximate Gamma UCL	3265		
95% Adjusted Gamma UCL	4065		

Potential UCL to Use	Use 99% Chebyshev (Mean, Sd) UCL	8897
Recommended UCL exceeds the maximum observation		

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_256	101-09-083	15	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1.7	Minimum of Log Data	0.531
Maximum	69.5	Maximum of Log Data	4.241
Mean	17.39	Mean of log Data	2.445
Median	12.8	SD of log Data	0.965
SD	20.07		
Coefficient of Variation	1.154		
Skewness	2.693		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.616	Shapiro Wilk Test Statistic	0.9
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	29.83	95% H-UCL	55.18
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	42.11
95% Adjusted-CLT UCL	34.81	97.5% Chebyshev (MVUE) UCL	52.9
95% Modified-t UCL	30.83	99% Chebyshev (MVUE) UCL	74.1

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.981	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	17.72	
nu star	17.66	
Approximate Chi Square Value (.05)	9.146	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 28.39
Adjusted Chi Square Value	7.888	95% Jackknife UCL 29.83
		95% Standard Bootstrap UCL 28.03
Anderson-Darling Test Statistic	0.702	95% Bootstrap-t UCL 55.52
Anderson-Darling 5% Critical Value	0.737	95% Hall's Bootstrap UCL 79.85
Kolmogorov-Smirnov Test Statistic	0.29	95% Percentile Bootstrap UCL 29.61
Kolmogorov-Smirnov 5% Critical Value	0.285	95% BCA Bootstrap UCL 33.04
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 46.55
		97.5% Chebyshev(Mean, Sd) UCL 59.17
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 83.96
95% Approximate Gamma UCL	33.58	
95% Adjusted Gamma UCL	38.93	

Potential UCL to Use		Use 95% Approximate Gamma UCL	33.58

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_257	101-09-083	15	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	254	Minimum of Log Data	5.537
Maximum	11900	Maximum of Log Data	9.384
Mean	3020	Mean of log Data	7.587
Median	2320	SD of log Data	1.009
SD	3445		
Coefficient of Variation	1.14		
Skewness	2.622		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.641	Shapiro Wilk Test Statistic	0.908
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5156	95% H-UCL	10736
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7666
95% Adjusted-CLT UCL	5981	97.5% Chebyshev (MVUE) UCL	9667
95% Modified-t UCL	5323	99% Chebyshev (MVUE) UCL	13596

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.95	Data appear Gamma Distributed at 5% Significance Level
Theta Star	3180	
nu star	17.1	
Approximate Chi Square Value (.05)	8.743	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 4909
Adjusted Chi Square Value	7.517	95% Jackknife UCL 5156
		95% Standard Bootstrap UCL 4786
Anderson-Darling Test Statistic	0.603	95% Bootstrap-t UCL 9420
Anderson-Darling 5% Critical Value	0.738	95% Hall's Bootstrap UCL 14173
Kolmogorov-Smirnov Test Statistic	0.238	95% Percentile Bootstrap UCL 5005
Kolmogorov-Smirnov 5% Critical Value	0.285	95% BCA Bootstrap UCL 6249
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 8025
		97.5% Chebyshev(Mean, Sd) UCL 10191
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 14445
95% Approximate Gamma UCL	5907	
95% Adjusted Gamma UCL	6871	

Potential UCL to Use		Use 95% Approximate Gamma UCL	5907

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_258	101-09-083	15	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	28.2	Minimum of Log Data	3.339
Maximum	536	Maximum of Log Data	6.284
Mean	349.9	Mean of log Data	5.619
Median	437	SD of log Data	0.93
SD	175.1		
Coefficient of Variation	0.5		
Skewness	-0.695		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Test Statistic	0.715
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	458.5	95% H-UCL	1194
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	957.6
95% Adjusted-CLT UCL	431.5	97.5% Chebyshev (MVUE) UCL	1199
95% Modified-t UCL	456.2	99% Chebyshev (MVUE) UCL	1673

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.574	Data appear Normal at 5% Significance Level	
Theta Star	222.3		
nu star	28.33		
Approximate Chi Square Value (.05)	17.19	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	445.9
Adjusted Chi Square Value	15.38	95% Jackknife UCL	458.5
		95% Standard Bootstrap UCL	438.9
Anderson-Darling Test Statistic	0.812	95% Bootstrap-t UCL	438.8
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	423.4
Kolmogorov-Smirnov Test Statistic	0.27	95% Percentile Bootstrap UCL	437.1
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	427.9
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	604.4
		97.5% Chebyshev(Mean, Sd) UCL	714.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	930.7
95% Approximate Gamma UCL	576.8		
95% Adjusted Gamma UCL	644.4		

Potential UCL to Use		Use 95% Student's-t UCL	458.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_259	101-09-084	15	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	10.5	Minimum of Log Data	2.351
Maximum	45.6	Maximum of Log Data	3.82
Mean	30.34	Mean of log Data	3.342
Median	34.3	SD of log Data	0.438
SD	10.32		
Coefficient of Variation	0.34		
Skewness	-0.719		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.943	Shapiro Wilk Test Statistic	0.838
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	36.74	95% H-UCL	43.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	50.57
95% Adjusted-CLT UCL	35.12	97.5% Chebyshev (MVUE) UCL	59.14
95% Modified-t UCL	36.6	99% Chebyshev (MVUE) UCL	75.98
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.882	Data appear Normal at 5% Significance Level	
Theta Star	6.215		
nu star	87.88		
Approximate Chi Square Value (.05)	67.27	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	36
Adjusted Chi Square Value	63.48	95% Jackknife UCL	36.74
		95% Standard Bootstrap UCL	35.71
Anderson-Darling Test Statistic	0.559	95% Bootstrap-t UCL	35.62
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	35.25
Kolmogorov-Smirnov Test Statistic	0.232	95% Percentile Bootstrap UCL	35.56
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	34.89
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	45.34
		97.5% Chebyshev(Mean, Sd) UCL	51.82
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	64.56
95% Approximate Gamma UCL	39.64		
95% Adjusted Gamma UCL	42.01		
Potential UCL to Use		Use 95% Student's-t UCL	36.74

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_260	101-09-084	15	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2610	Minimum of Log Data	7.867
Maximum	9290	Maximum of Log Data	9.137
Mean	6660	Mean of log Data	8.748
Median	7100	SD of log Data	0.387
SD	2005		
Coefficient of Variation	0.301		
Skewness	-1.074		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.908	Shapiro Wilk Test Statistic	0.806
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	7903	95% H-UCL	9088
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10543
95% Adjusted-CLT UCL	7504	97.5% Chebyshev (MVUE) UCL	12193
95% Modified-t UCL	7863	99% Chebyshev (MVUE) UCL	15435

Gamma Distribution Test		Data Distribution
k star (bias corrected)	6.169	Data appear Normal at 5% Significance Level
Theta Star	1080	
nu star	111	
Approximate Chi Square Value (.05)	87.72	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 7759
Adjusted Chi Square Value	83.35	95% Jackknife UCL 7903
		95% Standard Bootstrap UCL 7690
Anderson-Darling Test Statistic	0.699	95% Bootstrap-t UCL 7657
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL 7519
Kolmogorov-Smirnov Test Statistic	0.295	95% Percentile Bootstrap UCL 7629
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL 7523
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 9573
		97.5% Chebyshev(Mean, Sd) UCL 10834
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 13310
95% Approximate Gamma UCL	8431	
95% Adjusted Gamma UCL	8872	

Potential UCL to Use	Use 95% Student's-t UCL	7903

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_261	101-09-084	15	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	260	Minimum of Log Data	5.561
Maximum	1840	Maximum of Log Data	7.518
Mean	921.9	Mean of log Data	6.692
Median	951	SD of log Data	0.582
SD	475.2		
Coefficient of Variation	0.515		
Skewness	0.645		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Test Statistic	0.96
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1216	95% H-UCL	1575
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1739
95% Adjusted-CLT UCL	1219	97.5% Chebyshev (MVUE) UCL	2087
95% Modified-t UCL	1222	99% Chebyshev (MVUE) UCL	2770

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.656	Data appear Normal at 5% Significance Level	
Theta Star	347.1		
nu star	47.81		
Approximate Chi Square Value (.05)	32.94	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	1182
Adjusted Chi Square Value	30.36	95% Jackknife UCL	1216
		95% Standard Bootstrap UCL	1160
Anderson-Darling Test Statistic	0.194	95% Bootstrap-t UCL	1262
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	1279
Kolmogorov-Smirnov Test Statistic	0.147	95% Percentile Bootstrap UCL	1172
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	1210
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1612
		97.5% Chebyshev(Mean, Sd) UCL	1911
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2498
95% Approximate Gamma UCL	1338		
95% Adjusted Gamma UCL	1452		

Potential UCL to Use		Use 95% Student's-t UCL	1216

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_262	101-09-088	15	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2.9	Minimum of Log Data	1.065
Maximum	32.3	Maximum of Log Data	3.475
Mean	13.2	Mean of log Data	2.345
Median	10.9	SD of log Data	0.749
SD	9.452		
Coefficient of Variation	0.716		
Skewness	1.106		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.89	Shapiro Wilk Test Statistic	0.975
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	19.06	95% H-UCL	28.65
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	28.19
95% Adjusted-CLT UCL	19.62	97.5% Chebyshev (MVUE) UCL	34.62
95% Modified-t UCL	19.25	99% Chebyshev (MVUE) UCL	47.27

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.594	Data appear Normal at 5% Significance Level	
Theta Star	8.282		
nu star	28.69		
Approximate Chi Square Value (.05)	17.47	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	18.38
Adjusted Chi Square Value	15.65	95% Jackknife UCL	19.06
		95% Standard Bootstrap UCL	18.17
Anderson-Darling Test Statistic	0.244	95% Bootstrap-t UCL	21.36
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	20.09
Kolmogorov-Smirnov Test Statistic	0.168	95% Percentile Bootstrap UCL	18.2
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	19.21
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	26.93
		97.5% Chebyshev(Mean, Sd) UCL	32.88
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	44.55
95% Approximate Gamma UCL	21.68		
95% Adjusted Gamma UCL	24.2		

Potential UCL to Use		Use 95% Student's-t UCL	19.06

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_263	101-09-088	15	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	272	Minimum of Log Data	5.606
Maximum	4060	Maximum of Log Data	8.309
Mean	1892	Mean of log Data	7.272
Median	2080	SD of log Data	0.869
SD	1283		
Coefficient of Variation	0.678		
Skewness	0.52		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.933	Shapiro Wilk Test Statistic	0.929
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2687	95% H-UCL	5283
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4585
95% Adjusted-CLT UCL	2675	97.5% Chebyshev (MVUE) UCL	5708
95% Modified-t UCL	2700	99% Chebyshev (MVUE) UCL	7912

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.393	Data appear Normal at 5% Significance Level	
Theta Star	1358		
nu star	25.08		
Approximate Chi Square Value (.05)	14.67	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	2596
Adjusted Chi Square Value	13.02	95% Jackknife UCL	2687
		95% Standard Bootstrap UCL	2562
Anderson-Darling Test Statistic	0.269	95% Bootstrap-t UCL	2858
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	2936
Kolmogorov-Smirnov Test Statistic	0.201	95% Percentile Bootstrap UCL	2570
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	2686
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3756
		97.5% Chebyshev(Mean, Sd) UCL	4563
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6148
95% Approximate Gamma UCL	3234		
95% Adjusted Gamma UCL	3643		

Potential UCL to Use		Use 95% Student's-t UCL	2687

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_264	101-09-088	15	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	25.7	Minimum of Log Data	3.246
Maximum	92600	Maximum of Log Data	11.44
Mean	10503	Mean of log Data	5.801
Median	215	SD of log Data	2.324
SD	30787		
Coefficient of Variation	2.931		
Skewness	3		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.396	Shapiro Wilk Test Statistic	0.79
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	29586	95% H-UCL	1E+06
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10461
95% Adjusted-CLT UCL	38348	97.5% Chebyshev (MVUE) UCL	13919
95% Modified-t UCL	31296	99% Chebyshev (MVUE) UCL	20711
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.215	Data do not follow a Discernable Distribution (0.05)	
Theta Star	48908		
nu star	3.865		
Approximate Chi Square Value (.05)	0.669	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	27383
Adjusted Chi Square Value	0.443	95% Jackknife UCL	29586
		95% Standard Bootstrap UCL	26337
Anderson-Darling Test Statistic	1.908	95% Bootstrap-t UCL	3E+06
Anderson-Darling 5% Critical Value	0.841	95% Hall's Bootstrap UCL	1E+06
Kolmogorov-Smirnov Test Statistic	0.445	95% Percentile Bootstrap UCL	30986
Kolmogorov-Smirnov 5% Critical Value	0.307	95% BCA Bootstrap UCL	41319
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	55235
		97.5% Chebyshev(Mean, Sd) UCL	74591
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1E+05
95% Approximate Gamma UCL	60660		
95% Adjusted Gamma UCL	91686		

Potential UCL to Use		Use 95% Hall's Bootstrap UCL	1E+06

Recommended UCL exceeds the maximum observation

In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_265	101-09-134	15	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	2.7	Minimum of Log Data	0.993
Maximum	32.4	Maximum of Log Data	3.478
Mean	12.48	Mean of log Data	2.351
Median	11.2	SD of log Data	0.649
SD	8.159		
Coefficient of Variation	0.654		
Skewness	2.018		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.756	Shapiro Wilk Test Statistic	0.869
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	17.54	95% H-UCL	23.29
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.76
95% Adjusted-CLT UCL	18.91	97.5% Chebyshev (MVUE) UCL	30.01
95% Modified-t UCL	17.84	99% Chebyshev (MVUE) UCL	40.33

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.107	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	5.923		
nu star	37.92		
Approximate Chi Square Value (.05)	24.82	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	16.95
Adjusted Chi Square Value	22.61	95% Jackknife UCL	17.54
		95% Standard Bootstrap UCL	16.76
Anderson-Darling Test Statistic	0.702	95% Bootstrap-t UCL	21.31
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	40.64
Kolmogorov-Smirnov Test Statistic	0.245	95% Percentile Bootstrap UCL	17.48
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	18.63
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24.33
		97.5% Chebyshev(Mean, Sd) UCL	29.46
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	39.54
95% Approximate Gamma UCL	19.06		
95% Adjusted Gamma UCL	20.93		

Potential UCL to Use		Use 95% Approximate Gamma UCL	19.06

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_266	101-09-134	15	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	653	Minimum of Log Data	6.482
Maximum	11200	Maximum of Log Data	9.324
Mean	2858	Mean of log Data	7.63
Median	2200	SD of log Data	0.776
SD	3198		
Coefficient of Variation	1.119		
Skewness	2.751		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.593	Shapiro Wilk Test Statistic	0.897
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4840	95% H-UCL	6012
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5769
95% Adjusted-CLT UCL	5656	97.5% Chebyshev (MVUE) UCL	7109
95% Modified-t UCL	5003	99% Chebyshev (MVUE) UCL	9741

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.188	Data appear Lognormal at 5% Significance Level	
Theta Star	2406		
nu star	21.38		
Approximate Chi Square Value (.05)	11.87	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4611
Adjusted Chi Square Value	10.41	95% Jackknife UCL	4840
		95% Standard Bootstrap UCL	4555
Anderson-Darling Test Statistic	0.834	95% Bootstrap-t UCL	9199
Anderson-Darling 5% Critical Value	0.733	95% Hall's Bootstrap UCL	12518
Kolmogorov-Smirnov Test Statistic	0.323	95% Percentile Bootstrap UCL	4934
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	5201
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7504
		97.5% Chebyshev(Mean, Sd) UCL	9515
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	13464
95% Approximate Gamma UCL	5146		
95% Adjusted Gamma UCL	5869		

Potential UCL to Use		Use 95% H-UCL	6012

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_267	101-09-134	15	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	18.1	Minimum of Log Data	2.896
Maximum	144	Maximum of Log Data	4.97
Mean	59.7	Mean of log Data	3.961
Median	53.2	SD of log Data	0.54
SD	34.61		
Coefficient of Variation	0.58		
Skewness	2.001		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.776	Shapiro Wilk Test Statistic	0.904
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	81.15	95% H-UCL	95.42
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	107.2
95% Adjusted-CLT UCL	86.9	97.5% Chebyshev (MVUE) UCL	127.8
95% Modified-t UCL	82.44	99% Chebyshev (MVUE) UCL	168.2
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.778	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	21.49		
nu star	50		
Approximate Chi Square Value (.05)	34.76	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	78.68
Adjusted Chi Square Value	32.1	95% Jackknife UCL	81.15
		95% Standard Bootstrap UCL	77.3
Anderson-Darling Test Statistic	0.573	95% Bootstrap-t UCL	96.2
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	172.9
Kolmogorov-Smirnov Test Statistic	0.243	95% Percentile Bootstrap UCL	78.33
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	85.78
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	110
		97.5% Chebyshev(Mean, Sd) UCL	131.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	174.5
95% Approximate Gamma UCL	85.86		
95% Adjusted Gamma UCL	92.98		
Potential UCL to Use		Use 95% Approximate Gamma UCL	85.86

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_268	101-09-104	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	23.6	Minimum of Log Data	3.161
Maximum	53.4	Maximum of Log Data	3.978
Mean	36.39	Mean of log Data	3.559
Median	34.6	SD of log Data	0.277
SD	10.43		
Coefficient of Variation	0.287		
Skewness	0.778		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.943
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	42.85	95% H-UCL	44.42
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	51.06
95% Adjusted-CLT UCL	43.07	97.5% Chebyshev (MVUE) UCL	57.42
95% Modified-t UCL	43	99% Chebyshev (MVUE) UCL	69.92

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	9.772	Data appear Normal at 5% Significance Level	
Theta Star	3.724		
nu star	175.9		
Approximate Chi Square Value (.05)	146.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	42.11
Adjusted Chi Square Value	140.5	95% Jackknife UCL	42.85
		95% Standard Bootstrap UCL	41.92
Anderson-Darling Test Statistic	0.342	95% Bootstrap-t UCL	46.72
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	51.04
Kolmogorov-Smirnov Test Statistic	0.199	95% Percentile Bootstrap UCL	41.61
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	42.5
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	51.54
		97.5% Chebyshev(Mean, Sd) UCL	58.09
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	70.97
95% Approximate Gamma UCL	43.77		
95% Adjusted Gamma UCL	45.55		

Potential UCL to Use		Use 95% Student's-t UCL	42.85

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_269	101-09-104	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5630	Minimum of Log Data	8.636
Maximum	19700	Maximum of Log Data	9.888
Mean	10103	Mean of log Data	9.151
Median	9620	SD of log Data	0.389
SD	4256		
Coefficient of Variation	0.421		
Skewness	1.458		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.862	Shapiro Wilk Test Statistic	0.944
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	12742	95% H-UCL	13636
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	15817
95% Adjusted-CLT UCL	13174	97.5% Chebyshev (MVUE) UCL	18303
95% Modified-t UCL	12857	99% Chebyshev (MVUE) UCL	23185

Gamma Distribution Test		Data Distribution
k star (bias corrected)	4.95	Data appear Normal at 5% Significance Level
Theta Star	2041	
nu star	89.1	
Approximate Chi Square Value (.05)	68.34	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 12437
Adjusted Chi Square Value	64.51	95% Jackknife UCL 12742
		95% Standard Bootstrap UCL 12273
Anderson-Darling Test Statistic	0.325	95% Bootstrap-t UCL 13859
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL 23296
Kolmogorov-Smirnov Test Statistic	0.187	95% Percentile Bootstrap UCL 12458
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 13070
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 16288
		97.5% Chebyshev(Mean, Sd) UCL 18964
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 24220
95% Approximate Gamma UCL	13173	
95% Adjusted Gamma UCL	13954	

Potential UCL to Use		Use 95% Student's-t UCL	12742

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_270	101-09-104	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	143	Minimum of Log Data	4.963
Maximum	661	Maximum of Log Data	6.494
Mean	354.2	Mean of log Data	5.745
Median	306	SD of log Data	0.531
SD	189		
Coefficient of Variation	0.534		
Skewness	0.832		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.879	Shapiro Wilk Test Statistic	0.949
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	471.4	95% H-UCL	559.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	631.1
95% Adjusted-CLT UCL	476.5	97.5% Chebyshev (MVUE) UCL	751.1
95% Modified-t UCL	474.3	99% Chebyshev (MVUE) UCL	986.7

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.855	Data appear Normal at 5% Significance Level	
Theta Star	124.1		
nu star	51.39		
Approximate Chi Square Value (.05)	35.93	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	457.9
Adjusted Chi Square Value	33.22	95% Jackknife UCL	471.4
		95% Standard Bootstrap UCL	454.2
Anderson-Darling Test Statistic	0.317	95% Bootstrap-t UCL	520.6
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	527.5
Kolmogorov-Smirnov Test Statistic	0.204	95% Percentile Bootstrap UCL	454.8
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	468.7
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	628.9
		97.5% Chebyshev(Mean, Sd) UCL	747.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	981.1
95% Approximate Gamma UCL	506.7		
95% Adjusted Gamma UCL	548		

Potential UCL to Use		Use 95% Student's-t UCL	471.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_271	101-09-106	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	17.1	Minimum of Log Data	2.839
Maximum	88.3	Maximum of Log Data	4.481
Mean	37.46	Mean of log Data	3.514
Median	32.8	SD of log Data	0.473
SD	21.12		
Coefficient of Variation	0.564		
Skewness	2.018		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.789	Shapiro Wilk Test Statistic	0.945
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	50.55	95% H-UCL	54.74
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	62.79
95% Adjusted-CLT UCL	54.1	97.5% Chebyshev (MVUE) UCL	73.94
95% Modified-t UCL	51.34	99% Chebyshev (MVUE) UCL	95.84

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.223	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	11.62		
nu star	58.02		
Approximate Chi Square Value (.05)	41.51	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	49.04
Adjusted Chi Square Value	38.58	95% Jackknife UCL	50.55
		95% Standard Bootstrap UCL	48.29
Anderson-Darling Test Statistic	0.426	95% Bootstrap-t UCL	62.85
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	102.4
Kolmogorov-Smirnov Test Statistic	0.191	95% Percentile Bootstrap UCL	49.42
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	53.57
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	68.15
		97.5% Chebyshev(Mean, Sd) UCL	81.42
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	107.5
95% Approximate Gamma UCL	52.35		
95% Adjusted Gamma UCL	56.33		

Potential UCL to Use		Use 95% Approximate Gamma UCL	52.35

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_272	101-09-106	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5130	Minimum of Log Data	8.543
Maximum	15800	Maximum of Log Data	9.668
Mean	10057	Mean of log Data	9.171
Median	10000	SD of log Data	0.325
SD	3082		
Coefficient of Variation	0.306		
Skewness	0.317		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.976	Shapiro Wilk Test Statistic	0.966
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	11967	95% H-UCL	12841
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	14867
95% Adjusted-CLT UCL	11863	97.5% Chebyshev (MVUE) UCL	16939
95% Modified-t UCL	11985	99% Chebyshev (MVUE) UCL	21009

Gamma Distribution Test		Data Distribution
k star (bias corrected)	7.66	Data appear Normal at 5% Significance Level
Theta Star	1313	
nu star	137.9	
Approximate Chi Square Value (.05)	111.7	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 11746
Adjusted Chi Square Value	106.8	95% Jackknife UCL 11967
		95% Standard Bootstrap UCL 11619
Anderson-Darling Test Statistic	0.201	95% Bootstrap-t UCL 12084
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL 12237
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL 11640
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL 11709
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 14535
		97.5% Chebyshev(Mean, Sd) UCL 16472
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 20278
95% Approximate Gamma UCL	12408	
95% Adjusted Gamma UCL	12984	

Potential UCL to Use	Use 95% Student's-t UCL	11967

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_273	101-09-106	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	90.3	Minimum of Log Data	4.503
Maximum	2990	Maximum of Log Data	8.003
Mean	657.6	Mean of log Data	5.996
Median	290	SD of log Data	0.964
SD	894.4		
Coefficient of Variation	1.36		
Skewness	2.754		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.585	Shapiro Wilk Test Statistic	0.924
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1212	95% H-UCL	1915
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1464
95% Adjusted-CLT UCL	1440	97.5% Chebyshev (MVUE) UCL	1839
95% Modified-t UCL	1258	99% Chebyshev (MVUE) UCL	2576

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.843	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	780.3	
nu star	15.17	
Approximate Chi Square Value (.05)	7.379	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 1148
Adjusted Chi Square Value	6.269	95% Jackknife UCL 1212
		95% Standard Bootstrap UCL 1123
Anderson-Darling Test Statistic	0.763	95% Bootstrap-t UCL 2656
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL 3061
Kolmogorov-Smirnov Test Statistic	0.265	95% Percentile Bootstrap UCL 1202
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL 1498
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 1957
		97.5% Chebyshev(Mean, Sd) UCL 2519
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 3624
95% Approximate Gamma UCL	1352	
95% Adjusted Gamma UCL	1591	

Potential UCL to Use		Use 95% Approximate Gamma UCL	1352

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_274	101-09-107	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	23	Minimum of Log Data	3.135
Maximum	41.3	Maximum of Log Data	3.721
Mean	30.27	Mean of log Data	3.384
Median	26.1	SD of log Data	0.237
SD	7.564		
Coefficient of Variation	0.25		
Skewness	0.791		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.789	Shapiro Wilk Test Statistic	0.815
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	34.96	95% H-UCL	35.75
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	40.71
95% Adjusted-CLT UCL	35.12	97.5% Chebyshev (MVUE) UCL	45.24
95% Modified-t UCL	35.07	99% Chebyshev (MVUE) UCL	54.13

Gamma Distribution Test		Data Distribution
k star (bias corrected)	13.02	Data Follow Appr. Gamma Distribution at 5% Significance Level
Theta Star	2.325	
nu star	234.4	
Approximate Chi Square Value (.05)	199.9	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 34.41
Adjusted Chi Square Value	193.2	95% Jackknife UCL 34.96
		95% Standard Bootstrap UCL 34.17
Anderson-Darling Test Statistic	0.893	95% Bootstrap-t UCL 35.9
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL 33.21
Kolmogorov-Smirnov Test Statistic	0.268	95% Percentile Bootstrap UCL 34.32
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL 35.03
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 41.26
		97.5% Chebyshev(Mean, Sd) UCL 46.01
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 55.35
95% Approximate Gamma UCL	35.48	
95% Adjusted Gamma UCL	36.71	

Potential UCL to Use		Use 95% Approximate Gamma UCL	35.48

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_275	101-09-107	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	4930	Minimum of Log Data	8.503
Maximum	13100	Maximum of Log Data	9.48
Mean	7034	Mean of log Data	8.813
Median	6190	SD of log Data	0.302
SD	2533		
Coefficient of Variation	0.36		
Skewness	2.047		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.768	Shapiro Wilk Test Statistic	0.868
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	8605	95% H-UCL	8735
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	10084
95% Adjusted-CLT UCL	9039	97.5% Chebyshev (MVUE) UCL	11419
95% Modified-t UCL	8701	99% Chebyshev (MVUE) UCL	14041

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.536	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	933.5		
nu star	135.6		
Approximate Chi Square Value (.05)	109.7	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	8423
Adjusted Chi Square Value	104.8	95% Jackknife UCL	8605
		95% Standard Bootstrap UCL	8349
Anderson-Darling Test Statistic	0.631	95% Bootstrap-t UCL	11348
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	14909
Kolmogorov-Smirnov Test Statistic	0.213	95% Percentile Bootstrap UCL	8458
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	9074
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	10715
		97.5% Chebyshev(Mean, Sd) UCL	12307
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15436
95% Approximate Gamma UCL	8695		
95% Adjusted Gamma UCL	9103		

Potential UCL to Use		Use 95% Approximate Gamma UCL	8695

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_276	101-09-107	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	144	Minimum of Log Data	4.97
Maximum	841	Maximum of Log Data	6.735
Mean	431.9	Mean of log Data	5.925
Median	402	SD of log Data	0.595
SD	228.8		
Coefficient of Variation	0.53		
Skewness	0.482		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	573.7	95% H-UCL	750.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	822.3
95% Adjusted-CLT UCL	570.4	97.5% Chebyshev (MVUE) UCL	989
95% Modified-t UCL	575.7	99% Chebyshev (MVUE) UCL	1317

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.506	Data appear Normal at 5% Significance Level	
Theta Star	172.4		
nu star	45.1		
Approximate Chi Square Value (.05)	30.69	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	557.3
Adjusted Chi Square Value	28.21	95% Jackknife UCL	573.7
		95% Standard Bootstrap UCL	552.1
Anderson-Darling Test Statistic	0.189	95% Bootstrap-t UCL	602.9
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	589.5
Kolmogorov-Smirnov Test Statistic	0.139	95% Percentile Bootstrap UCL	552.1
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	556.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	764.3
		97.5% Chebyshev(Mean, Sd) UCL	908.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1191
95% Approximate Gamma UCL	634.6		
95% Adjusted Gamma UCL	690.5		

Potential UCL to Use		Use 95% Student's-t UCL	573.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_277	101-09-108	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	31.8	Minimum of Log Data	3.459
Maximum	62.6	Maximum of Log Data	4.137
Mean	45.7	Mean of log Data	3.798
Median	45.9	SD of log Data	0.233
SD	10.56		
Coefficient of Variation	0.231		
Skewness	0.31		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.954	Shapiro Wilk Test Statistic	0.958
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	52.25	95% H-UCL	53.84
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	61.23
95% Adjusted-CLT UCL	51.88	97.5% Chebyshev (MVUE) UCL	67.95
95% Modified-t UCL	52.31	99% Chebyshev (MVUE) UCL	81.15

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	14.11	Data appear Normal at 5% Significance Level	
Theta Star	3.239		
nu star	253.9		
Approximate Chi Square Value (.05)	218	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	51.49
Adjusted Chi Square Value	211	95% Jackknife UCL	52.25
		95% Standard Bootstrap UCL	51.03
Anderson-Darling Test Statistic	0.212	95% Bootstrap-t UCL	52.67
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	53.08
Kolmogorov-Smirnov Test Statistic	0.13	95% Percentile Bootstrap UCL	51.36
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	51.58
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	61.04
		97.5% Chebyshev(Mean, Sd) UCL	67.68
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	80.72
95% Approximate Gamma UCL	53.22		
95% Adjusted Gamma UCL	55		

Potential UCL to Use		Use 95% Student's-t UCL	52.25

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_278	101-09-108	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	3590	Minimum of Log Data	8.186
Maximum	20600	Maximum of Log Data	9.933
Mean	12098	Mean of log Data	9.27
Median	10300	SD of log Data	0.575
SD	5980		
Coefficient of Variation	0.494		
Skewness	0.17		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.935
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	15804	95% H-UCL	20521
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	22715
95% Adjusted-CLT UCL	15497	97.5% Chebyshev (MVUE) UCL	27235
95% Modified-t UCL	15823	99% Chebyshev (MVUE) UCL	36113

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.726	Data appear Normal at 5% Significance Level
Theta Star	4438	
nu star	49.07	
Approximate Chi Square Value (.05)	33.99	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 15377
Adjusted Chi Square Value	31.36	95% Jackknife UCL 15804
		95% Standard Bootstrap UCL 15192
Anderson-Darling Test Statistic	0.254	95% Bootstrap-t UCL 16078
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL 15331
Kolmogorov-Smirnov Test Statistic	0.149	95% Percentile Bootstrap UCL 15111
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL 15182
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 20787
		97.5% Chebyshev(Mean, Sd) UCL 24546
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 31931
95% Approximate Gamma UCL	17466	
95% Adjusted Gamma UCL	18929	

Potential UCL to Use	Use 95% Student's-t UCL	15804

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_279	101-09-108	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	133	Minimum of Log Data	4.89
Maximum	2470	Maximum of Log Data	7.812
Mean	812.9	Mean of log Data	6.263
Median	421	SD of log Data	0.969
SD	858.5		
Coefficient of Variation	1.056		
Skewness	1.491		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.737	Shapiro Wilk Test Statistic	0.936
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1345	95% H-UCL	2537
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1926
95% Adjusted-CLT UCL	1436	97.5% Chebyshev (MVUE) UCL	2420
95% Modified-t UCL	1369	99% Chebyshev (MVUE) UCL	3391

Gamma Distribution Test		Data Distribution
k star (bias corrected)	0.929	Data appear Gamma Distributed at 5% Significance Level
Theta Star	875	
nu star	16.72	
Approximate Chi Square Value (.05)	8.474	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 1284
Adjusted Chi Square Value	7.27	95% Jackknife UCL 1345
		95% Standard Bootstrap UCL 1262
Anderson-Darling Test Statistic	0.582	95% Bootstrap-t UCL 2781
Anderson-Darling 5% Critical Value	0.738	95% Hall's Bootstrap UCL 4232
Kolmogorov-Smirnov Test Statistic	0.25	95% Percentile Bootstrap UCL 1328
Kolmogorov-Smirnov 5% Critical Value	0.285	95% BCA Bootstrap UCL 1440
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 2060
		97.5% Chebyshev(Mean, Sd) UCL 2600
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 3660
95% Approximate Gamma UCL	1604	
95% Adjusted Gamma UCL	1870	

Potential UCL to Use		Use 95% Approximate Gamma UCL	1604

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_280	101-09-109	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	18.5	Minimum of Log Data	2.918
Maximum	50.9	Maximum of Log Data	3.93
Mean	31.07	Mean of log Data	3.377
Median	26.9	SD of log Data	0.365
SD	11.45		
Coefficient of Variation	0.369		
Skewness	0.566		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.912	Shapiro Wilk Test Statistic	0.929
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	38.17	95% H-UCL	41.07
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	47.66
95% Adjusted-CLT UCL	38.11	97.5% Chebyshev (MVUE) UCL	54.84
95% Modified-t UCL	38.29	99% Chebyshev (MVUE) UCL	68.96

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.774	Data appear Normal at 5% Significance Level	
Theta Star	5.381		
nu star	103.9		
Approximate Chi Square Value (.05)	81.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	37.35
Adjusted Chi Square Value	77.21	95% Jackknife UCL	38.17
		95% Standard Bootstrap UCL	36.97
Anderson-Darling Test Statistic	0.371	95% Bootstrap-t UCL	39.85
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	37.23
Kolmogorov-Smirnov Test Statistic	0.184	95% Percentile Bootstrap UCL	37.08
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	37.71
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	47.71
		97.5% Chebyshev(Mean, Sd) UCL	54.91
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	69.05
95% Approximate Gamma UCL	39.66		
95% Adjusted Gamma UCL	41.82		

Potential UCL to Use	Use 95% Student's-t UCL	38.17

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_281	101-09-109	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5250	Minimum of Log Data	8.566
Maximum	15800	Maximum of Log Data	9.668
Mean	11801	Mean of log Data	9.307
Median	14000	SD of log Data	0.419
SD	4121		
Coefficient of Variation	0.349		
Skewness	-0.687		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.85	Shapiro Wilk Test Statistic	0.821
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	14355	95% H-UCL	16605
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	19219
95% Adjusted-CLT UCL	13724	97.5% Chebyshev (MVUE) UCL	22385
95% Modified-t UCL	14303	99% Chebyshev (MVUE) UCL	28605

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.013	Data appear Normal at 5% Significance Level	
Theta Star	2354		
nu star	90.23		
Approximate Chi Square Value (.05)	69.33	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	14060
Adjusted Chi Square Value	65.47	95% Jackknife UCL	14355
		95% Standard Bootstrap UCL	13931
Anderson-Darling Test Statistic	0.725	95% Bootstrap-t UCL	14072
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	13594
Kolmogorov-Smirnov Test Statistic	0.281	95% Percentile Bootstrap UCL	13791
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	13683
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17788
		97.5% Chebyshev(Mean, Sd) UCL	20379
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	25468
95% Approximate Gamma UCL	15359		
95% Adjusted Gamma UCL	16263		

Potential UCL to Use		Use 95% Student's-t UCL	14355

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_282	101-09-109	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	106	Minimum of Log Data	4.663
Maximum	867	Maximum of Log Data	6.765
Mean	327.7	Mean of log Data	5.464
Median	185	SD of log Data	0.819
SD	303.3		
Coefficient of Variation	0.926		
Skewness	1.351		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.73	Shapiro Wilk Test Statistic	0.85
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	515.6	95% H-UCL	763.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	701.9
95% Adjusted-CLT UCL	542.6	97.5% Chebyshev (MVUE) UCL	869
95% Modified-t UCL	523.2	99% Chebyshev (MVUE) UCL	1197

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.19	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	275.3		
nu star	21.42		
Approximate Chi Square Value (.05)	11.91	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	493.9
Adjusted Chi Square Value	10.44	95% Jackknife UCL	515.6
		95% Standard Bootstrap UCL	484.5
Anderson-Darling Test Statistic	0.792	95% Bootstrap-t UCL	856.7
Anderson-Darling 5% Critical Value	0.733	95% Hall's Bootstrap UCL	844.2
Kolmogorov-Smirnov Test Statistic	0.258	95% Percentile Bootstrap UCL	493.4
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	538.1
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	768.3
		97.5% Chebyshev(Mean, Sd) UCL	959
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1333
95% Approximate Gamma UCL	589.6		
95% Adjusted Gamma UCL	672.3		

Potential UCL to Use		Use 95% Approximate Gamma UCL	589.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_283	101-09-111B	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	19.1	Minimum of Log Data	2.95
Maximum	79.9	Maximum of Log Data	4.381
Mean	47.43	Mean of log Data	3.767
Median	37.9	SD of log Data	0.466
SD	21.06		
Coefficient of Variation	0.444		
Skewness	0.444		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Test Statistic	0.93
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	60.48	95% H-UCL	69.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	80.19
95% Adjusted-CLT UCL	60.09	97.5% Chebyshev (MVUE) UCL	94.3
95% Modified-t UCL	60.66	99% Chebyshev (MVUE) UCL	122

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.783	Data appear Normal at 5% Significance Level	
Theta Star	12.54		
nu star	68.09		
Approximate Chi Square Value (.05)	50.09	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	58.98
Adjusted Chi Square Value	46.85	95% Jackknife UCL	60.48
		95% Standard Bootstrap UCL	58.02
Anderson-Darling Test Statistic	0.402	95% Bootstrap-t UCL	61.87
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	58
Kolmogorov-Smirnov Test Statistic	0.198	95% Percentile Bootstrap UCL	58.91
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	59.61
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	78.03
		97.5% Chebyshev(Mean, Sd) UCL	91.26
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	117.3
95% Approximate Gamma UCL	64.47		
95% Adjusted Gamma UCL	68.93		

Potential UCL to Use		Use 95% Student's-t UCL	60.48

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_284	101-09-111B	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	5220	Minimum of Log Data	8.56
Maximum	18200	Maximum of Log Data	9.809
Mean	10701	Mean of log Data	9.179
Median	9780	SD of log Data	0.481
SD	4931		
Coefficient of Variation	0.461		
Skewness	0.413		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.9	Shapiro Wilk Test Statistic	0.91
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	13758	95% H-UCL	15994
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	18311
95% Adjusted-CLT UCL	13647	97.5% Chebyshev (MVUE) UCL	21594
95% Modified-t UCL	13795	99% Chebyshev (MVUE) UCL	28044

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.529	Data appear Normal at 5% Significance Level	
Theta Star	3032		
nu star	63.52		
Approximate Chi Square Value (.05)	46.19	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	13405
Adjusted Chi Square Value	43.09	95% Jackknife UCL	13758
		95% Standard Bootstrap UCL	13261
Anderson-Darling Test Statistic	0.373	95% Bootstrap-t UCL	14149
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	13156
Kolmogorov-Smirnov Test Statistic	0.177	95% Percentile Bootstrap UCL	13280
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	13267
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	17866
		97.5% Chebyshev(Mean, Sd) UCL	20966
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	27055
95% Approximate Gamma UCL	14717		
95% Adjusted Gamma UCL	15777		

Potential UCL to Use		Use 95% Student's-t UCL	13758

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_285	101-09-111B	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	90.9	Minimum of Log Data	4.51
Maximum	687	Maximum of Log Data	6.532
Mean	255.2	Mean of log Data	5.378
Median	193	SD of log Data	0.577
SD	178.3		
Coefficient of Variation	0.699		
Skewness	2.093		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.762	Shapiro Wilk Test Statistic	0.942
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	365.7	95% H-UCL	420
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	464.6
95% Adjusted-CLT UCL	397.3	97.5% Chebyshev (MVUE) UCL	557.1
95% Modified-t UCL	372.7	99% Chebyshev (MVUE) UCL	738.9

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.214	Data appear Gamma Distributed at 5% Significance Level
Theta Star	115.2	
nu star	39.86	
Approximate Chi Square Value (.05)	26.4	**Nonparametric Statistics**
Adjusted Level of Significance	0.0231	95% CLT UCL 353
Adjusted Chi Square Value	24.11	95% Jackknife UCL 365.7
		95% Standard Bootstrap UCL 345.2
Anderson-Darling Test Statistic	0.501	95% Bootstrap-t UCL 495.2
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL 742.3
Kolmogorov-Smirnov Test Statistic	0.264	95% Percentile Bootstrap UCL 360.9
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL 391.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 514.3
		97.5% Chebyshev(Mean, Sd) UCL 626.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 846.6
95% Approximate Gamma UCL	385.4	
95% Adjusted Gamma UCL	422	

Potential UCL to Use	Use 95% Approximate Gamma UCL	385.4

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_286	101-09-137	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	13.7	Minimum of Log Data	2.617
Maximum	41.1	Maximum of Log Data	3.716
Mean	25.66	Mean of log Data	3.197
Median	24.7	SD of log Data	0.332
SD	8.248		
Coefficient of Variation	0.321		
Skewness	0.483		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.973	Shapiro Wilk Test Statistic	0.981
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	30.77	95% H-UCL	32.93
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	38.15
95% Adjusted-CLT UCL	30.65	97.5% Chebyshev (MVUE) UCL	43.54
95% Modified-t UCL	30.84	99% Chebyshev (MVUE) UCL	54.13

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	7.215	Data appear Normal at 5% Significance Level	
Theta Star	3.556		
nu star	129.9		
Approximate Chi Square Value (.05)	104.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	30.18
Adjusted Chi Square Value	99.76	95% Jackknife UCL	30.77
		95% Standard Bootstrap UCL	29.92
Anderson-Darling Test Statistic	0.168	95% Bootstrap-t UCL	31.59
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	31.92
Kolmogorov-Smirnov Test Statistic	0.148	95% Percentile Bootstrap UCL	30.02
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	30.52
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	37.64
		97.5% Chebyshev(Mean, Sd) UCL	42.83
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	53.01
95% Approximate Gamma UCL	31.87		
95% Adjusted Gamma UCL	33.4		

Potential UCL to Use		Use 95% Student's-t UCL	30.77

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_287	101-09-137	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	750	Minimum of Log Data	6.62
Maximum	8140	Maximum of Log Data	9.005
Mean	3954	Mean of log Data	8.045
Median	3690	SD of log Data	0.784
SD	2612		
Coefficient of Variation	0.66		
Skewness	0.515		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Test Statistic	0.946
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5573	95% H-UCL	9275
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8831
95% Adjusted-CLT UCL	5546	97.5% Chebyshev (MVUE) UCL	10893
95% Modified-t UCL	5598	99% Chebyshev (MVUE) UCL	14942

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.577	Data appear Normal at 5% Significance Level	
Theta Star	2508		
nu star	28.38		
Approximate Chi Square Value (.05)	17.23	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5387
Adjusted Chi Square Value	15.42	95% Jackknife UCL	5573
		95% Standard Bootstrap UCL	5276
Anderson-Darling Test Statistic	0.246	95% Bootstrap-t UCL	5666
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	5524
Kolmogorov-Smirnov Test Statistic	0.177	95% Percentile Bootstrap UCL	5349
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	5494
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7749
		97.5% Chebyshev(Mean, Sd) UCL	9392
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	12617
95% Approximate Gamma UCL	6515		
95% Adjusted Gamma UCL	7278		

Potential UCL to Use		Use 95% Student's-t UCL	5573

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_288	101-09-137	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	30.9	Minimum of Log Data	3.431
Maximum	158	Maximum of Log Data	5.063
Mean	78.41	Mean of log Data	4.222
Median	78.8	SD of log Data	0.569
SD	43.43		
Coefficient of Variation	0.554		
Skewness	0.804		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.916	Shapiro Wilk Test Statistic	0.953
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	105.3	95% H-UCL	130.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	144.6
95% Adjusted-CLT UCL	106.4	97.5% Chebyshev (MVUE) UCL	173.2
95% Modified-t UCL	106	99% Chebyshev (MVUE) UCL	229.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.568	Data appear Normal at 5% Significance Level	
Theta Star	30.54		
nu star	46.22		
Approximate Chi Square Value (.05)	31.62	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	102.2
Adjusted Chi Square Value	29.1	95% Jackknife UCL	105.3
		95% Standard Bootstrap UCL	100.2
Anderson-Darling Test Statistic	0.24	95% Bootstrap-t UCL	112.8
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	119.9
Kolmogorov-Smirnov Test Statistic	0.14	95% Percentile Bootstrap UCL	100.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	103.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	141.5
		97.5% Chebyshev(Mean, Sd) UCL	168.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	222.4
95% Approximate Gamma UCL	114.6		
95% Adjusted Gamma UCL	124.6		

Potential UCL to Use		Use 95% Student's-t UCL	105.3

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_289	101-09-140	16	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	7.1	Minimum of Log Data	1.96
Maximum	294	Maximum of Log Data	5.684
Mean	68.53	Mean of log Data	3.751
Median	39.5	SD of log Data	0.993
SD	87.66		
Coefficient of Variation	1.279		
Skewness	2.633		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.608	Shapiro Wilk Test Statistic	0.903
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	122.9	95% H-UCL	220.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	161.7
95% Adjusted-CLT UCL	144	97.5% Chebyshev (MVUE) UCL	203.7
95% Modified-t UCL	127.1	99% Chebyshev (MVUE) UCL	286

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.867	Data appear Lognormal at 5% Significance Level	
Theta Star	79.09		
nu star	15.6		
Approximate Chi Square Value (.05)	7.679	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	116.6
Adjusted Chi Square Value	6.543	95% Jackknife UCL	122.9
		95% Standard Bootstrap UCL	113.8
Anderson-Darling Test Statistic	0.828	95% Bootstrap-t UCL	342.9
Anderson-Darling 5% Critical Value	0.74	95% Hall's Bootstrap UCL	468.6
Kolmogorov-Smirnov Test Statistic	0.338	95% Percentile Bootstrap UCL	120.5
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL	146.9
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	195.9
		97.5% Chebyshev(Mean, Sd) UCL	251
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	359.3
95% Approximate Gamma UCL	139.2		
95% Adjusted Gamma UCL	163.4		

Potential UCL to Use		Use 95% H-UCL	220.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_290	101-09-140	16	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1850	Minimum of Log Data	7.523
Maximum	76600	Maximum of Log Data	11.25
Mean	17082	Mean of log Data	9.225
Median	8650	SD of log Data	1.012
SD	23175		
Coefficient of Variation	1.357		
Skewness	2.628		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.6	Shapiro Wilk Test Statistic	0.904
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	31447	95% H-UCL	55809
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	39653
95% Adjusted-CLT UCL	37020	97.5% Chebyshev (MVUE) UCL	50014
95% Modified-t UCL	32575	99% Chebyshev (MVUE) UCL	70365

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.806	Data appear Lognormal at 5% Significance Level	
Theta Star	21200		
nu star	14.5		
Approximate Chi Square Value (.05)	6.918	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	29789
Adjusted Chi Square Value	5.849	95% Jackknife UCL	31447
		95% Standard Bootstrap UCL	28881
Anderson-Darling Test Statistic	0.873	95% Bootstrap-t UCL	1E+05
Anderson-Darling 5% Critical Value	0.742	95% Hall's Bootstrap UCL	1E+05
Kolmogorov-Smirnov Test Statistic	0.323	95% Percentile Bootstrap UCL	30981
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL	38203
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	50754
		97.5% Chebyshev(Mean, Sd) UCL	65324
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	93944
95% Approximate Gamma UCL	35815		
95% Adjusted Gamma UCL	42359		

Potential UCL to Use		Use 95% Chebyshev (MVUE) UCL	39653

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_291	101-09-140	16	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	30.4	Minimum of Log Data	3.414
Maximum	1370	Maximum of Log Data	7.223
Mean	322.2	Mean of log Data	5.281
Median	183	SD of log Data	1.022
SD	411.8		
Coefficient of Variation	1.278		
Skewness	2.547		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.617	Shapiro Wilk Test Statistic	0.888
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	577.4	95% H-UCL	1113
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	778.5
95% Adjusted-CLT UCL	672.5	97.5% Chebyshev (MVUE) UCL	982.7
95% Modified-t UCL	596.9	99% Chebyshev (MVUE) UCL	1384

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.841	Data appear Lognormal at 5% Significance Level	
Theta Star	383.3		
nu star	15.13		
Approximate Chi Square Value (.05)	7.351	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	548
Adjusted Chi Square Value	6.244	95% Jackknife UCL	577.4
		95% Standard Bootstrap UCL	538.3
Anderson-Darling Test Statistic	0.877	95% Bootstrap-t UCL	1716
Anderson-Darling 5% Critical Value	0.741	95% Hall's Bootstrap UCL	2464
Kolmogorov-Smirnov Test Statistic	0.35	95% Percentile Bootstrap UCL	558.2
Kolmogorov-Smirnov 5% Critical Value	0.286	95% BCA Bootstrap UCL	672
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	920.6
		97.5% Chebyshev(Mean, Sd) UCL	1179
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1688
95% Approximate Gamma UCL	663		
95% Adjusted Gamma UCL	780.6		

Potential UCL to Use		Use 95% Chebyshev (MVUE) UCL	778.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_292	101-09-115	17	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	9	Minimum of Log Data	2.197
Maximum	43.2	Maximum of Log Data	3.766
Mean	27.22	Mean of log Data	3.224
Median	27.2	SD of log Data	0.457
SD	10.34		
Coefficient of Variation	0.38		
Skewness	0.0617		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Test Statistic	0.859
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	33.63	95% H-UCL	40.06
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	46.1
95% Adjusted-CLT UCL	32.97	97.5% Chebyshev (MVUE) UCL	54.12
95% Modified-t UCL	33.64	99% Chebyshev (MVUE) UCL	69.88
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.363	Data appear Normal at 5% Significance Level	
Theta Star	6.239		
nu star	78.54		
Approximate Chi Square Value (.05)	59.12	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	32.89
Adjusted Chi Square Value	55.58	95% Jackknife UCL	33.63
		95% Standard Bootstrap UCL	32.5
Anderson-Darling Test Statistic	0.485	95% Bootstrap-t UCL	34.54
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	37.57
Kolmogorov-Smirnov Test Statistic	0.206	95% Percentile Bootstrap UCL	32.41
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	32.58
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	42.24
		97.5% Chebyshev(Mean, Sd) UCL	48.74
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	61.5
95% Approximate Gamma UCL	36.16		
95% Adjusted Gamma UCL	38.47		
Potential UCL to Use		Use 95% Student's-t UCL	33.63

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_293	101-09-115	17	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	2310	Minimum of Log Data	7.745
Maximum	9010	Maximum of Log Data	9.106
Mean	6106	Mean of log Data	8.649
Median	6050	SD of log Data	0.418
SD	2136		
Coefficient of Variation	0.35		
Skewness	-0.317		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.959	Shapiro Wilk Test Statistic	0.894
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	7429	95% H-UCL	8591
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9944
95% Adjusted-CLT UCL	7196	97.5% Chebyshev (MVUE) UCL	11580
95% Modified-t UCL	7417	99% Chebyshev (MVUE) UCL	14794

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	5.094	Data appear Normal at 5% Significance Level	
Theta Star	1199		
nu star	91.69		
Approximate Chi Square Value (.05)	70.61	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	7276
Adjusted Chi Square Value	66.72	95% Jackknife UCL	7429
		95% Standard Bootstrap UCL	7205
Anderson-Darling Test Statistic	0.318	95% Bootstrap-t UCL	7326
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	7208
Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	7192
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	7134
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9209
		97.5% Chebyshev(Mean, Sd) UCL	10551
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	13189
95% Approximate Gamma UCL	7928		
95% Adjusted Gamma UCL	8391		

Potential UCL to Use		Use 95% Student's-t UCL	7429

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_294	101-09-115	17	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	57	Minimum of Log Data	4.043
Maximum	355	Maximum of Log Data	5.872
Mean	214.7	Mean of log Data	5.257
Median	181	SD of log Data	0.551
SD	93.95		
Coefficient of Variation	0.438		
Skewness	-0.0082		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.961	Shapiro Wilk Test Statistic	0.884
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	272.9	95% H-UCL	355.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	397.5
95% Adjusted-CLT UCL	266.1	97.5% Chebyshev (MVUE) UCL	474.7
95% Modified-t UCL	272.9	99% Chebyshev (MVUE) UCL	626.2

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.157	Data appear Normal at 5% Significance Level	
Theta Star	67.99		
nu star	56.83		
Approximate Chi Square Value (.05)	40.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	266.2
Adjusted Chi Square Value	37.61	95% Jackknife UCL	272.9
		95% Standard Bootstrap UCL	262.9
Anderson-Darling Test Statistic	0.335	95% Bootstrap-t UCL	274.9
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	271.1
Kolmogorov-Smirnov Test Statistic	0.173	95% Percentile Bootstrap UCL	264.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	262.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	351.2
		97.5% Chebyshev(Mean, Sd) UCL	410.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	526.3
95% Approximate Gamma UCL	301.2		
95% Adjusted Gamma UCL	324.3		

Potential UCL to Use		Use 95% Student's-t UCL	272.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_295	101-09-120	17	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	15.5	Minimum of Log Data	2.741
Maximum	51.9	Maximum of Log Data	3.949
Mean	32.32	Mean of log Data	3.391
Median	32.6	SD of log Data	0.447
SD	13.39		
Coefficient of Variation	0.414		
Skewness	0.0898		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.921	Shapiro Wilk Test Statistic	0.916
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	40.62	95% H-UCL	46.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	53.77
95% Adjusted-CLT UCL	39.81	97.5% Chebyshev (MVUE) UCL	63
95% Modified-t UCL	40.65	99% Chebyshev (MVUE) UCL	81.14

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.126	Data appear Normal at 5% Significance Level	
Theta Star	7.834		
nu star	74.27		
Approximate Chi Square Value (.05)	55.42	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	39.67
Adjusted Chi Square Value	52	95% Jackknife UCL	40.62
		95% Standard Bootstrap UCL	39.25
Anderson-Darling Test Statistic	0.393	95% Bootstrap-t UCL	40.32
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	38.53
Kolmogorov-Smirnov Test Statistic	0.212	95% Percentile Bootstrap UCL	39.3
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	39.26
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	51.78
		97.5% Chebyshev(Mean, Sd) UCL	60.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	76.74
95% Approximate Gamma UCL	43.31		
95% Adjusted Gamma UCL	46.16		

Potential UCL to Use	Use 95% Student's-t UCL	40.62

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_296	101-09-120	17	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1700	Minimum of Log Data	7.438
Maximum	9980	Maximum of Log Data	9.208
Mean	6184	Mean of log Data	8.597
Median	6530	SD of log Data	0.597
SD	2895		
Coefficient of Variation	0.468		
Skewness	-0.275		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.947	Shapiro Wilk Test Statistic	0.892
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	7979	95% H-UCL	10878
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	11918
95% Adjusted-CLT UCL	7677	97.5% Chebyshev (MVUE) UCL	14336
95% Modified-t UCL	7964	99% Chebyshev (MVUE) UCL	19087

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.692	Data appear Normal at 5% Significance Level	
Theta Star	2298		
nu star	48.45		
Approximate Chi Square Value (.05)	33.47	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	7772
Adjusted Chi Square Value	30.87	95% Jackknife UCL	7979
		95% Standard Bootstrap UCL	7679
Anderson-Darling Test Statistic	0.369	95% Bootstrap-t UCL	7933
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	7598
Kolmogorov-Smirnov Test Statistic	0.166	95% Percentile Bootstrap UCL	7636
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	7630
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	10391
		97.5% Chebyshev(Mean, Sd) UCL	12210
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	15785
95% Approximate Gamma UCL	8952		
95% Adjusted Gamma UCL	9707		

Potential UCL to Use		Use 95% Student's-t UCL	7979

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	ProUCL Outputs for Asarco
From File	C:\lhilsche\Asarco Hayden\oct07\EPCs6\all6a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_297	101-09-120	17	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	59.2	Minimum of Log Data	4.081
Maximum	319	Maximum of Log Data	5.765
Mean	173.5	Mean of log Data	5.013
Median	169	SD of log Data	0.588
SD	92.64		
Coefficient of Variation	0.534		
Skewness	0.391		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.942	Shapiro Wilk Test Statistic	0.955
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	230.9	95% H-UCL	297.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	327.4
95% Adjusted-CLT UCL	228.6	97.5% Chebyshev (MVUE) UCL	393.3
95% Modified-t UCL	231.6	99% Chebyshev (MVUE) UCL	522.9

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	2.509	Data appear Normal at 5% Significance Level	
Theta Star	69.14		
nu star	45.17		
Approximate Chi Square Value (.05)	30.75	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	224.3
Adjusted Chi Square Value	28.26	95% Jackknife UCL	230.9
		95% Standard Bootstrap UCL	221.3
Anderson-Darling Test Statistic	0.21	95% Bootstrap-t UCL	236
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	227.7
Kolmogorov-Smirnov Test Statistic	0.135	95% Percentile Bootstrap UCL	222.1
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	224.7
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	308.1
		97.5% Chebyshev(Mean, Sd) UCL	366.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	480.7
95% Approximate Gamma UCL	254.8		
95% Adjusted Gamma UCL	277.3		

Potential UCL to Use		Use 95% Student's-t UCL	230.9

ProUCL Outputs
Winkelman Residential Properties

Table of Contents for ProUCL Outputs - Residential Zones 18 - 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL File Number	Parcel	Zone	Parameter
1	101-12-008F	18	Arsenic
2	101-12-008F	18	Copper
3	101-12-008F	18	Lead
4	101-12-008J	18	Arsenic
5	101-12-008J	18	Copper
6	101-12-008J	18	Lead
7	101-12-008K	18	Arsenic
8	101-12-008K	18	Copper
9	101-12-008K	18	Lead
10	101-12-023A	18	Arsenic
11	101-12-023A	18	Copper
12	101-12-023A	18	Lead
13	101-12-288	18	Arsenic
14	101-12-288	18	Copper
15	101-12-288	18	Lead
16	101-12-071	19	Arsenic
17	101-12-071	19	Copper
18	101-12-071	19	Lead
19	101-12-073	19	Arsenic
20	101-12-073	19	Copper
21	101-12-073	19	Lead
22	101-12-075	19	Arsenic
23	101-12-075	19	Copper
24	101-12-075	19	Lead
25	101-12-101A	19	Arsenic
26	101-12-101A	19	Copper
27	101-12-101A	19	Lead
28	101-12-102	19	Arsenic
29	101-12-102	19	Copper
30	101-12-102	19	Lead
31	101-12-093	20	Arsenic
32	101-12-093	20	Copper
33	101-12-093	20	Lead
34	101-12-094A	20	Arsenic
35	101-12-094A	20	Copper
36	101-12-094A	20	Lead
37	101-12-108	20	Arsenic
38	101-12-108	20	Copper
39	101-12-108	20	Lead
40	101-12-130	21	Arsenic
41	101-12-130	21	Copper
42	101-12-130	21	Lead
43	101-12-142	21	Arsenic
44	101-12-142	21	Copper
45	101-12-142	21	Lead

Table of Contents for ProUCL Outputs - Residential Zones 18 - 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL File Number	Parcel	Zone	Parameter
46	101-12-149	21	Arsenic
47	101-12-149	21	Copper
48	101-12-149	21	Lead
49	101-12-150	21	Arsenic
50	101-12-150	21	Copper
51	101-12-150	21	Lead
52	101-12-136	22	Arsenic
53	101-12-136	22	Copper
54	101-12-136	22	Lead
55	101-12-147A	22	Arsenic
56	101-12-147A	22	Copper
57	101-12-147A	22	Lead
58	101-12-187	22	Arsenic
59	101-12-187	22	Copper
60	101-12-187	22	Lead
61	101-12-188B	22	Arsenic
62	101-12-188B	22	Copper
63	101-12-188B	22	Lead
64	101-12-193	23	Arsenic
65	101-12-193	23	Copper
66	101-12-193	23	Lead
67	101-12-234	23	Arsenic
68	101-12-234	23	Copper
69	101-12-234	23	Lead
70	101-12-236	23	Arsenic
71	101-12-236	23	Copper
72	101-12-236	23	Lead
73	101-10-019	24	Arsenic
74	101-10-019	24	Copper
75	101-10-019	24	Lead
76	101-10-023	24	Arsenic
77	101-10-023	24	Copper
78	101-10-023	24	Lead
79	101-12-241	24	Arsenic
80	101-12-241	24	Copper
81	101-12-241	24	Lead
82	101-12-154A	25	Arsenic
83	101-12-154A	25	Copper
84	101-12-154A	25	Lead
85	101-12-155	25	Arsenic
86	101-12-155	25	Copper
87	101-12-155	25	Lead
88	101-12-204	25	Arsenic
89	101-12-204	25	Copper
90	101-12-204	25	Lead

Table of Contents for ProUCL Outputs - Residential Zones 18 - 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

ProUCL File Number	Parcel	Zone	Parameter
91	101-12-267	25	Arsenic
92	101-12-267	25	Copper
93	101-12-267	25	Lead

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_1	101-12-008F	18	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	7

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.9	Minimum of Log Data	0.642
Maximum	9	Maximum of Log Data	2.197
Mean	3.833	Mean of log Data	1.22
Median	3.2	SD of log Data	0.498
SD	2.296		
Coefficient of Variation	0.599		
Skewness	1.774		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.778	Shapiro Wilk Test Statistic	0.903
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	5.256	95% H-UCL	5.747
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.549
95% Adjusted-CLT UCL	5.575	97.5% Chebyshev (MVUE) UCL	7.749
95% Modified-t UCL	5.332	99% Chebyshev (MVUE) UCL	10.11

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.868	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.337		
nu star	51.63		
Approximate Chi Square Value (.05)	36.12	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5.092
Adjusted Chi Square Value	33.41	95% Jackknife UCL	5.256
		95% Standard Bootstrap UCL	5.037
Anderson-Darling Test Statistic	0.601	95% Bootstrap-t UCL	8.084
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	12.61
Kolmogorov-Smirnov Test Statistic	0.243	95% Percentile Bootstrap UCL	5.067
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	5.433
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7.169
		97.5% Chebyshev(Mean, Sd) UCL	8.612
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	11.45
95% Approximate Gamma UCL	5.478		
95% Adjusted Gamma UCL	5.924		

Potential UCL to Use		Use 95% Approximate Gamma UCL	5.478

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_2	101-12-008F	18	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	190	Minimum of Log Data	5.247
Maximum	1110	Maximum of Log Data	7.012
Mean	486	Mean of log Data	6.057
Median	486	SD of log Data	0.539
SD	273.3		
Coefficient of Variation	0.562		
Skewness	1.514		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.842	Shapiro Wilk Test Statistic	0.936
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	655.4	95% H-UCL	775.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	871.5
95% Adjusted-CLT UCL	685	97.5% Chebyshev (MVUE) UCL	1039
95% Modified-t UCL	663.1	99% Chebyshev (MVUE) UCL	1367

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.763	Data appear Normal at 5% Significance Level	
Theta Star	175.9		
nu star	49.73		
Approximate Chi Square Value (.05)	34.54	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	635.9
Adjusted Chi Square Value	31.89	95% Jackknife UCL	655.4
		95% Standard Bootstrap UCL	628
Anderson-Darling Test Statistic	0.409	95% Bootstrap-t UCL	710.8
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	1352
Kolmogorov-Smirnov Test Statistic	0.198	95% Percentile Bootstrap UCL	643.3
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	680.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	883.1
		97.5% Chebyshev(Mean, Sd) UCL	1055
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1392
95% Approximate Gamma UCL	699.8		
95% Adjusted Gamma UCL	757.9		

Potential UCL to Use		Use 95% Student's-t UCL	655.4

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_3	101-12-008F	18	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	12.9	Minimum of Log Data	2.557
Maximum	99.9	Maximum of Log Data	4.604
Mean	37.08	Mean of log Data	3.401
Median	25.2	SD of log Data	0.67
SD	27.91		
Coefficient of Variation	0.753		
Skewness	1.641		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.824	Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	54.38	95% H-UCL	69.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	72.74
95% Adjusted-CLT UCL	57.82	97.5% Chebyshev (MVUE) UCL	88.44
95% Modified-t UCL	55.22	99% Chebyshev (MVUE) UCL	119.3

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.746	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	21.23		
nu star	31.43		
Approximate Chi Square Value (.05)	19.62	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	52.38
Adjusted Chi Square Value	17.68	95% Jackknife UCL	54.38
		95% Standard Bootstrap UCL	51.31
Anderson-Darling Test Statistic	0.338	95% Bootstrap-t UCL	66.68
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	103.6
Kolmogorov-Smirnov Test Statistic	0.195	95% Percentile Bootstrap UCL	52.17
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	56.46
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	77.63
		97.5% Chebyshev(Mean, Sd) UCL	95.17
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	129.6
95% Approximate Gamma UCL	59.39		
95% Adjusted Gamma UCL	65.91		

Potential UCL to Use		Use 95% Approximate Gamma UCL	59.39

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_4	101-12-008J	18	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.1	Minimum of Log Data	1.411
Maximum	28	Maximum of Log Data	3.332
Mean	14.49	Mean of log Data	2.477
Median	12.7	SD of log Data	0.694
SD	8.969		
Coefficient of Variation	0.619		
Skewness	0.47		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.908	Shapiro Wilk Test Statistic	0.941
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	20.05	95% H-UCL	28.99
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	29.85
95% Adjusted-CLT UCL	19.91	97.5% Chebyshev (MVUE) UCL	36.41
95% Modified-t UCL	20.13	99% Chebyshev (MVUE) UCL	49.3

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.873	Data appear Normal at 5% Significance Level	
Theta Star	7.734		
nu star	33.72		
Approximate Chi Square Value (.05)	21.44	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	19.41
Adjusted Chi Square Value	19.4	95% Jackknife UCL	20.05
		95% Standard Bootstrap UCL	19.02
Anderson-Darling Test Statistic	0.263	95% Bootstrap-t UCL	20.72
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	19.32
Kolmogorov-Smirnov Test Statistic	0.169	95% Percentile Bootstrap UCL	19.13
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	19.57
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	27.52
		97.5% Chebyshev(Mean, Sd) UCL	33.16
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	44.24
95% Approximate Gamma UCL	22.79		
95% Adjusted Gamma UCL	25.18		

Potential UCL to Use		Use 95% Student's-t UCL	20.05

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_5	101-12-008J	18	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	130	Minimum of Log Data	4.868
Maximum	519	Maximum of Log Data	6.252
Mean	292.7	Mean of log Data	5.607
Median	297	SD of log Data	0.415
SD	114.4		
Coefficient of Variation	0.391		
Skewness	0.6		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.953	Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	363.6	95% H-UCL	408.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	472.5
95% Adjusted-CLT UCL	363.5	97.5% Chebyshev (MVUE) UCL	549.9
95% Modified-t UCL	364.8	99% Chebyshev (MVUE) UCL	701.8

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.8	Data appear Normal at 5% Significance Level	
Theta Star	60.98		
nu star	86.4		
Approximate Chi Square Value (.05)	65.97	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	355.4
Adjusted Chi Square Value	62.22	95% Jackknife UCL	363.6
		95% Standard Bootstrap UCL	350.7
Anderson-Darling Test Statistic	0.248	95% Bootstrap-t UCL	372.8
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	386.7
Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	350.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	356.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	458.8
		97.5% Chebyshev(Mean, Sd) UCL	530.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	672
95% Approximate Gamma UCL	383.3		
95% Adjusted Gamma UCL	406.4		

Potential UCL to Use		Use 95% Student's-t UCL	363.6

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_6	101-12-008J	18	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	29.2	Minimum of Log Data	3.374
Maximum	392	Maximum of Log Data	5.971
Mean	127.5	Mean of log Data	4.428
Median	88.8	SD of log Data	0.972
SD	124.9		
Coefficient of Variation	0.98		
Skewness	1.393		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.809	Shapiro Wilk Test Statistic	0.901
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	204.9	95% H-UCL	408.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	308.6
95% Adjusted-CLT UCL	216.6	97.5% Chebyshev (MVUE) UCL	387.9
95% Modified-t UCL	208.1	99% Chebyshev (MVUE) UCL	543.7

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.963	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	132.3		
nu star	17.34		
Approximate Chi Square Value (.05)	8.915	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	196
Adjusted Chi Square Value	7.675	95% Jackknife UCL	204.9
		95% Standard Bootstrap UCL	191
Anderson-Darling Test Statistic	0.495	95% Bootstrap-t UCL	259
Anderson-Darling 5% Critical Value	0.737	95% Hall's Bootstrap UCL	216.7
Kolmogorov-Smirnov Test Statistic	0.221	95% Percentile Bootstrap UCL	191.1
Kolmogorov-Smirnov 5% Critical Value	0.285	95% BCA Bootstrap UCL	212
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	309
		97.5% Chebyshev(Mean, Sd) UCL	387.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	541.8
95% Approximate Gamma UCL	247.9		
95% Adjusted Gamma UCL	287.9		

Potential UCL to Use		Use 95% Approximate Gamma UCL	247.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_7	101-12-008K	18	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.1	Minimum of Log Data	1.131
Maximum	4.5	Maximum of Log Data	1.504
Mean	3.8	Mean of log Data	1.326
Median	3.6	SD of log Data	0.14
SD	0.532		
Coefficient of Variation	0.14		
Skewness	0.0963		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Test Statistic	0.907
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4.129	95% H-UCL	4.173
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4.577
95% Adjusted-CLT UCL	4.097	97.5% Chebyshev (MVUE) UCL	4.913
95% Modified-t UCL	4.13	99% Chebyshev (MVUE) UCL	5.573

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	38.3	Data appear Normal at 5% Significance Level	
Theta Star	0.0992		
nu star	689.4		
Approximate Chi Square Value (.05)	629.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4.091
Adjusted Chi Square Value	617.3	95% Jackknife UCL	4.129
		95% Standard Bootstrap UCL	4.068
Anderson-Darling Test Statistic	0.446	95% Bootstrap-t UCL	4.128
Anderson-Darling 5% Critical Value	0.72	95% Hall's Bootstrap UCL	4.039
Kolmogorov-Smirnov Test Statistic	0.197	95% Percentile Bootstrap UCL	4.078
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	4.078
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4.572
		97.5% Chebyshev(Mean, Sd) UCL	4.906
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	5.563
95% Approximate Gamma UCL	4.162		
95% Adjusted Gamma UCL	4.243		

Potential UCL to Use		Use 95% Student's-t UCL	4.129

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_8	101-12-008K	18	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics

Minimum	172
Maximum	825
Mean	442.7
Median	349
SD	250.1
Coefficient of Variation	0.565
Skewness	0.612

Log-transformed Statistics

Minimum of Log Data	5.147
Maximum of Log Data	6.715
Mean of log Data	5.945
SD of log Data	0.583

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.886
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.932
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	597.7
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	598
95% Modified-t UCL	600.5

Assuming Lognormal Distribution

95% H-UCL	748.3
95% Chebyshev (MVUE) UCL	825.4
97.5% Chebyshev (MVUE) UCL	990.8
99% Chebyshev (MVUE) UCL	1316

Gamma Distribution Test

k star (bias corrected)	2.438
Theta Star	181.6
nu star	43.88
Approximate Chi Square Value (.05)	29.69
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	27.25
Anderson-Darling Test Statistic	0.341
Anderson-Darling 5% Critical Value	0.726
Kolmogorov-Smirnov Test Statistic	0.174
Kolmogorov-Smirnov 5% Critical Value	0.281

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	654.3
95% Adjusted Gamma UCL	712.8

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	579.8
95% Jackknife UCL	597.7
95% Standard Bootstrap UCL	572.4
95% Bootstrap-t UCL	635.9
95% Hall's Bootstrap UCL	597.8
95% Percentile Bootstrap UCL	578.1
95% BCA Bootstrap UCL	585.2
95% Chebyshev(Mean, Sd) UCL	806.1
97.5% Chebyshev(Mean, Sd) UCL	963.3
99% Chebyshev(Mean, Sd) UCL	1272

Potential UCL to Use

Use 95% Student's-t UCL 597.7

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_9	101-12-008K	18	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	19.7	Minimum of Log Data	2.981
Maximum	49.1	Maximum of Log Data	3.894
Mean	28.42	Mean of log Data	3.296
Median	22.2	SD of log Data	0.327
SD	10.22		
Coefficient of Variation	0.36		
Skewness	1.201		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.816	Shapiro Wilk Test Statistic	0.849
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	34.76	95% H-UCL	36.18
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	41.9
95% Adjusted-CLT UCL	35.49	97.5% Chebyshev (MVUE) UCL	47.77
95% Modified-t UCL	34.99	99% Chebyshev (MVUE) UCL	59.3

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	6.753	Data appear Lognormal at 5% Significance Level	
Theta Star	4.209		
nu star	121.5		
Approximate Chi Square Value (.05)	97.09	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	34.03
Adjusted Chi Square Value	92.48	95% Jackknife UCL	34.76
		95% Standard Bootstrap UCL	33.8
Anderson-Darling Test Statistic	0.733	95% Bootstrap-t UCL	37.9
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	34.3
Kolmogorov-Smirnov Test Statistic	0.296	95% Percentile Bootstrap UCL	33.96
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	35.2
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	43.28
		97.5% Chebyshev(Mean, Sd) UCL	49.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	62.33
95% Approximate Gamma UCL	35.58		
95% Adjusted Gamma UCL	37.35		

Potential UCL to Use		Use 95% Student's-t UCL	34.76
		or 95% Modified-t UCL	34.99
		or 95% H-UCL	36.18

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_10	101-12-023A	18	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		Log-transformed Statistics	
Minimum	3	Minimum of Log Data	1.099
Maximum	6.2	Maximum of Log Data	1.825
Mean	4.467	Mean of log Data	1.478
Median	4.4	SD of log Data	0.206
SD	0.907		
Coefficient of Variation	0.203		
Skewness	0.362		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	5.029	95% H-UCL	5.153
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5.811
95% Adjusted-CLT UCL	5.003	97.5% Chebyshev (MVUE) UCL	6.391
95% Modified-t UCL	5.035	99% Chebyshev (MVUE) UCL	7.533

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	18.1	Data appear Normal at 5% Significance Level	
Theta Star	0.247		
nu star	325.8		
Approximate Chi Square Value (.05)	285	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4.964
Adjusted Chi Square Value	277	95% Jackknife UCL	5.029
		95% Standard Bootstrap UCL	4.94
Anderson-Darling Test Statistic	0.265	95% Bootstrap-t UCL	5.11
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	5.208
Kolmogorov-Smirnov Test Statistic	0.178	95% Percentile Bootstrap UCL	4.956
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	4.989
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5.784
		97.5% Chebyshev(Mean, Sd) UCL	6.355
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7.475
95% Approximate Gamma UCL	5.106		
95% Adjusted Gamma UCL	5.255		

Potential UCL to Use		Use 95% Student's-t UCL	5.029

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_11	101-12-023A	18	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	75.6	Minimum of Log Data	4.325
Maximum	646	Maximum of Log Data	6.471
Mean	254.5	Mean of log Data	5.244
Median	153	SD of log Data	0.816
SD	208		
Coefficient of Variation	0.817		
Skewness	1.058		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.842	Shapiro Wilk Test Statistic	0.912
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	383.4	95% H-UCL	607.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	560.2
95% Adjusted-CLT UCL	394.7	97.5% Chebyshev (MVUE) UCL	693.4
95% Modified-t UCL	387.5	99% Chebyshev (MVUE) UCL	955.1

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.3	Data appear Normal at 5% Significance Level	
Theta Star	195.7		
nu star	23.41		
Approximate Chi Square Value (.05)	13.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	368.5
Adjusted Chi Square Value	11.83	95% Jackknife UCL	383.4
		95% Standard Bootstrap UCL	361.6
Anderson-Darling Test Statistic	0.433	95% Bootstrap-t UCL	467.8
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	397.2
Kolmogorov-Smirnov Test Statistic	0.203	95% Percentile Bootstrap UCL	372.3
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	385.7
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	556.7
		97.5% Chebyshev(Mean, Sd) UCL	687.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	944.3
95% Approximate Gamma UCL	444.6		
95% Adjusted Gamma UCL	503.5		

Potential UCL to Use		Use 95% Student's-t UCL	383.4

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_12	101-12-023A	18	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	15.5	Minimum of Log Data	2.741
Maximum	667	Maximum of Log Data	6.503
Mean	141.5	Mean of log Data	4.21
Median	41.6	SD of log Data	1.245
SD	208.1		
Coefficient of Variation	1.471		
Skewness	2.456		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.649	Shapiro Wilk Test Statistic	0.926
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	270.5	95% H-UCL	808.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	370.4
95% Adjusted-CLT UCL	316.3	97.5% Chebyshev (MVUE) UCL	474.9
95% Modified-t UCL	280	99% Chebyshev (MVUE) UCL	680.4

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.607	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	232.9		
nu star	10.93		
Approximate Chi Square Value (.05)	4.533	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	255.6
Adjusted Chi Square Value	3.704	95% Jackknife UCL	270.5
		95% Standard Bootstrap UCL	250.8
Anderson-Darling Test Statistic	0.575	95% Bootstrap-t UCL	492.7
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	633.8
Kolmogorov-Smirnov Test Statistic	0.251	95% Percentile Bootstrap UCL	263.1
Kolmogorov-Smirnov 5% Critical Value	0.289	95% BCA Bootstrap UCL	334.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	443.9
		97.5% Chebyshev(Mean, Sd) UCL	574.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	831.8
95% Approximate Gamma UCL	341.2		
95% Adjusted Gamma UCL	417.6		

Potential UCL to Use		Use 95% Approximate Gamma UCL	341.2

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_13	101-12-288	18	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.9	Minimum of Log Data	1.065
Maximum	5.9	Maximum of Log Data	1.775
Mean	4.2	Mean of log Data	1.415
Median	4	SD of log Data	0.21
SD	0.896		
Coefficient of Variation	0.213		
Skewness	0.656		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.954	Shapiro Wilk Test Statistic	0.974
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4.755	95% H-UCL	4.859
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5.486
95% Adjusted-CLT UCL	4.761	97.5% Chebyshev (MVUE) UCL	6.043
95% Modified-t UCL	4.766	99% Chebyshev (MVUE) UCL	7.137

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	17.06	Data appear Normal at 5% Significance Level	
Theta Star	0.246		
nu star	307		
Approximate Chi Square Value (.05)	267.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4.691
Adjusted Chi Square Value	259.6	95% Jackknife UCL	4.755
		95% Standard Bootstrap UCL	4.65
Anderson-Darling Test Statistic	0.25	95% Bootstrap-t UCL	4.921
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	5.207
Kolmogorov-Smirnov Test Statistic	0.189	95% Percentile Bootstrap UCL	4.678
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	4.722
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5.502
		97.5% Chebyshev(Mean, Sd) UCL	6.065
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7.171
95% Approximate Gamma UCL	4.822		
95% Adjusted Gamma UCL	4.967		

Potential UCL to Use		Use 95% Student's-t UCL	4.755

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_14	101-12-288	18	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	78.3	Minimum of Log Data	4.361
Maximum	417	Maximum of Log Data	6.033
Mean	268.7	Mean of log Data	5.489
Median	286	SD of log Data	0.529
SD	112.2		
Coefficient of Variation	0.418		
Skewness	-0.312		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.96	Shapiro Wilk Test Statistic	0.89
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	338.3	95% H-UCL	432.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	487.7
95% Adjusted-CLT UCL	326.1	97.5% Chebyshev (MVUE) UCL	580.3
95% Modified-t UCL	337.6	99% Chebyshev (MVUE) UCL	762.1

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.378	Data appear Normal at 5% Significance Level	
Theta Star	79.54		
nu star	60.81		
Approximate Chi Square Value (.05)	43.87	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	330.2
Adjusted Chi Square Value	40.86	95% Jackknife UCL	338.3
		95% Standard Bootstrap UCL	325.9
Anderson-Darling Test Statistic	0.322	95% Bootstrap-t UCL	333.7
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	326.5
Kolmogorov-Smirnov Test Statistic	0.17	95% Percentile Bootstrap UCL	324.8
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	326.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	431.8
		97.5% Chebyshev(Mean, Sd) UCL	502.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	640.9
95% Approximate Gamma UCL	372.4		
95% Adjusted Gamma UCL	399.9		

Potential UCL to Use		Use 95% Student's-t UCL	338.3

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_15	101-12-288	18	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	14.3	Minimum of Log Data	2.66
Maximum	433	Maximum of Log Data	6.071
Mean	78.43	Mean of log Data	3.726
Median	31.8	SD of log Data	0.986
SD	133.8		
Coefficient of Variation	1.706		
Skewness	2.931		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.493	Shapiro Wilk Test Statistic	0.818
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	161.4	95% H-UCL	211
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	156.1
95% Adjusted-CLT UCL	198.3	97.5% Chebyshev (MVUE) UCL	196.5
95% Modified-t UCL	168.6	99% Chebyshev (MVUE) UCL	275.8

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.685	Data do not follow a Discernable Distribution (0.05)	
Theta Star	114.5		
nu star	12.33		
Approximate Chi Square Value (.05)	5.448	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	151.8
Adjusted Chi Square Value	4.521	95% Jackknife UCL	161.4
		95% Standard Bootstrap UCL	149.2
Anderson-Darling Test Statistic	1.296	95% Bootstrap-t UCL	629.3
Anderson-Darling 5% Critical Value	0.746	95% Hall's Bootstrap UCL	497.3
Kolmogorov-Smirnov Test Statistic	0.346	95% Percentile Bootstrap UCL	164.4
Kolmogorov-Smirnov 5% Critical Value	0.288	95% BCA Bootstrap UCL	177.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	272.8
		97.5% Chebyshev(Mean, Sd) UCL	356.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	522.1
95% Approximate Gamma UCL	177.6		
95% Adjusted Gamma UCL	214		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	272.8

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_16	101-12-071	19	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.2	Minimum of Log Data	1.435
Maximum	165	Maximum of Log Data	5.106
Mean	44.99	Mean of log Data	3.079
Median	16	SD of log Data	1.198
SD	62.71		
Coefficient of Variation	1.394		
Skewness	1.627		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.618	Shapiro Wilk Test Statistic	0.829
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	83.86	95% H-UCL	220.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	111.5
95% Adjusted-CLT UCL	91.49	97.5% Chebyshev (MVUE) UCL	142.6
95% Modified-t UCL	85.75	99% Chebyshev (MVUE) UCL	203.7

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.617	Data appear Lognormal at 5% Significance Level	
Theta Star	72.93		
nu star	11.1		
Approximate Chi Square Value (.05)	4.643	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	79.37
Adjusted Chi Square Value	3.802	95% Jackknife UCL	83.86
		95% Standard Bootstrap UCL	77.06
Anderson-Darling Test Statistic	1.249	95% Bootstrap-t UCL	469.6
Anderson-Darling 5% Critical Value	0.749	95% Hall's Bootstrap UCL	601.6
Kolmogorov-Smirnov Test Statistic	0.4	95% Percentile Bootstrap UCL	78.1
Kolmogorov-Smirnov 5% Critical Value	0.289	95% BCA Bootstrap UCL	88.01
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	136.1
		97.5% Chebyshev(Mean, Sd) UCL	175.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	253
95% Approximate Gamma UCL	107.6		
95% Adjusted Gamma UCL	131.4		

Potential UCL to Use		Use 95% Chebyshev (MVUE) UCL	111.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_17	101-12-071	19	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	73.9	Minimum of Log Data	4.303
Maximum	1190	Maximum of Log Data	7.082
Mean	505.9	Mean of log Data	6.034
Median	506	SD of log Data	0.747
SD	300.9		
Coefficient of Variation	0.595		
Skewness	1.361		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.859	Shapiro Wilk Test Statistic	0.833
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	692.4	95% H-UCL	1141
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1124
95% Adjusted-CLT UCL	719.5	97.5% Chebyshev (MVUE) UCL	1381
95% Modified-t UCL	700	99% Chebyshev (MVUE) UCL	1885

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.908	Data appear Normal at 5% Significance Level	
Theta Star	265.1		
nu star	34.34		
Approximate Chi Square Value (.05)	21.94	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	670.9
Adjusted Chi Square Value	19.87	95% Jackknife UCL	692.4
		95% Standard Bootstrap UCL	666
Anderson-Darling Test Statistic	0.557	95% Bootstrap-t UCL	765.4
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	1629
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL	676.4
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	708
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	943.1
		97.5% Chebyshev(Mean, Sd) UCL	1132
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1504
95% Approximate Gamma UCL	791.9		
95% Adjusted Gamma UCL	874.2		

Potential UCL to Use		Use 95% Student's-t UCL	692.4

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_18	101-12-071	19	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	14.4	Minimum of Log Data	2.667
Maximum	274	Maximum of Log Data	5.613
Mean	106	Mean of log Data	4.401
Median	74.4	SD of log Data	0.826
SD	80.07		
Coefficient of Variation	0.755		
Skewness	1.43		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.814	Shapiro Wilk Test Statistic	0.877
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	155.6	95% H-UCL	268.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	244.7
95% Adjusted-CLT UCL	163.5	97.5% Chebyshev (MVUE) UCL	303.2
95% Modified-t UCL	157.7	99% Chebyshev (MVUE) UCL	418.1

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.444	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	73.38		
nu star	26		
Approximate Chi Square Value (.05)	15.38	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	149.9
Adjusted Chi Square Value	13.68	95% Jackknife UCL	155.6
		95% Standard Bootstrap UCL	147.1
Anderson-Darling Test Statistic	0.596	95% Bootstrap-t UCL	226.2
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	459.2
Kolmogorov-Smirnov Test Statistic	0.247	95% Percentile Bootstrap UCL	150
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	155.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	222.3
		97.5% Chebyshev(Mean, Sd) UCL	272.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	371.6
95% Approximate Gamma UCL	179.2		
95% Adjusted Gamma UCL	201.4		

Potential UCL to Use		Use 95% Approximate Gamma UCL	179.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_19	101-12-073	19	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.4	Minimum of Log Data	0.336
Maximum	11.1	Maximum of Log Data	2.407
Mean	5.9	Mean of log Data	1.598
Median	5.2	SD of log Data	0.671
SD	3.416		
Coefficient of Variation	0.579		
Skewness	0.473		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk Test Statistic	0.934
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	8.017	95% H-UCL	11.48
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	12.02
95% Adjusted-CLT UCL	7.965	97.5% Chebyshev (MVUE) UCL	14.62
95% Modified-t UCL	8.047	99% Chebyshev (MVUE) UCL	19.72

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.062	Data appear Normal at 5% Significance Level	
Theta Star	2.861		
nu star	37.12		
Approximate Chi Square Value (.05)	24.17	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	7.773
Adjusted Chi Square Value	21.99	95% Jackknife UCL	8.017
		95% Standard Bootstrap UCL	7.657
Anderson-Darling Test Statistic	0.29	95% Bootstrap-t UCL	8.377
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	8.3
Kolmogorov-Smirnov Test Statistic	0.149	95% Percentile Bootstrap UCL	7.644
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	7.844
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	10.86
		97.5% Chebyshev(Mean, Sd) UCL	13.01
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	17.23
95% Approximate Gamma UCL	9.061		
95% Adjusted Gamma UCL	9.959		

Potential UCL to Use		Use 95% Student's-t UCL	8.017

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_20	101-12-073	19	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	191	Minimum of Log Data	5.252
Maximum	677	Maximum of Log Data	6.518
Mean	453.7	Mean of log Data	6.058
Median	505	SD of log Data	0.387
SD	150		
Coefficient of Variation	0.331		
Skewness	-0.337		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.972	Shapiro Wilk Test Statistic	0.913
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	546.7	95% H-UCL	617.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	716.1
95% Adjusted-CLT UCL	529.9	97.5% Chebyshev (MVUE) UCL	828.3
95% Modified-t UCL	545.7	99% Chebyshev (MVUE) UCL	1049

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.807	Data appear Normal at 5% Significance Level	
Theta Star	78.13		
nu star	104.5		
Approximate Chi Square Value (.05)	81.93	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	535.9
Adjusted Chi Square Value	77.72	95% Jackknife UCL	546.7
		95% Standard Bootstrap UCL	530.7
Anderson-Darling Test Statistic	0.324	95% Bootstrap-t UCL	543.1
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	534.9
Kolmogorov-Smirnov Test Statistic	0.223	95% Percentile Bootstrap UCL	528.3
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	523.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	671.7
		97.5% Chebyshev(Mean, Sd) UCL	766
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	951.3
95% Approximate Gamma UCL	578.8		
95% Adjusted Gamma UCL	610.1		

Potential UCL to Use		Use 95% Student's-t UCL	546.7

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_21	101-12-073	19	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	39.8	Minimum of Log Data	3.684
Maximum	185	Maximum of Log Data	5.22
Mean	101.8	Mean of log Data	4.54
Median	101	SD of log Data	0.449
SD	42.06		
Coefficient of Variation	0.413		
Skewness	0.62		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.956	Shapiro Wilk Test Statistic	0.95
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	127.9	95% H-UCL	147.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	170
95% Adjusted-CLT UCL	127.9	97.5% Chebyshev (MVUE) UCL	199.2
95% Modified-t UCL	128.3	99% Chebyshev (MVUE) UCL	256.6

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.209	Data appear Normal at 5% Significance Level	
Theta Star	24.18		
nu star	75.76		
Approximate Chi Square Value (.05)	56.71	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	124.9
Adjusted Chi Square Value	53.25	95% Jackknife UCL	127.9
		95% Standard Bootstrap UCL	123
Anderson-Darling Test Statistic	0.265	95% Bootstrap-t UCL	130.6
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	139.7
Kolmogorov-Smirnov Test Statistic	0.188	95% Percentile Bootstrap UCL	124.5
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	125.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	162.9
		97.5% Chebyshev(Mean, Sd) UCL	189.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	241.3
95% Approximate Gamma UCL	136		
95% Adjusted Gamma UCL	144.8		

Potential UCL to Use		Use 95% Student's-t UCL	127.9

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_22	101-12-075	19	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.1	Minimum of Log Data	0.0953
Maximum	5.6	Maximum of Log Data	1.723
Mean	3.089	Mean of log Data	1.012
Median	3	SD of log Data	0.523
SD	1.545		
Coefficient of Variation	0.5		
Skewness	0.711		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Test Statistic	0.956
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4.046	95% H-UCL	4.861
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	5.496
95% Adjusted-CLT UCL	4.066	97.5% Chebyshev (MVUE) UCL	6.532
95% Modified-t UCL	4.067	99% Chebyshev (MVUE) UCL	8.567

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.054	Data appear Normal at 5% Significance Level	
Theta Star	1.012		
nu star	54.97		
Approximate Chi Square Value (.05)	38.93	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	3.936
Adjusted Chi Square Value	36.1	95% Jackknife UCL	4.046
		95% Standard Bootstrap UCL	3.886
Anderson-Darling Test Statistic	0.264	95% Bootstrap-t UCL	4.392
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	5.002
Kolmogorov-Smirnov Test Statistic	0.16	95% Percentile Bootstrap UCL	3.933
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	4.067
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5.333
		97.5% Chebyshev(Mean, Sd) UCL	6.304
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	8.212
95% Approximate Gamma UCL	4.361		
95% Adjusted Gamma UCL	4.703		

Potential UCL to Use		Use 95% Student's-t UCL	4.046

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_23	101-12-075	19	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	181	Minimum of Log Data	5.198
Maximum	796	Maximum of Log Data	6.68
Mean	470.3	Mean of log Data	6.051
Median	461	SD of log Data	0.497
SD	213.4		
Coefficient of Variation	0.454		
Skewness	0.322		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.95	Shapiro Wilk Test Statistic	0.958
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	602.6	95% H-UCL	719.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	820.2
95% Adjusted-CLT UCL	595.5	97.5% Chebyshev (MVUE) UCL	970.3
95% Modified-t UCL	603.9	99% Chebyshev (MVUE) UCL	1265

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.441	Data appear Normal at 5% Significance Level	
Theta Star	136.7		
nu star	61.94		
Approximate Chi Square Value (.05)	44.84	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	587.4
Adjusted Chi Square Value	41.79	95% Jackknife UCL	602.6
		95% Standard Bootstrap UCL	575.9
Anderson-Darling Test Statistic	0.195	95% Bootstrap-t UCL	609.1
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	618.6
Kolmogorov-Smirnov Test Statistic	0.127	95% Percentile Bootstrap UCL	578.4
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	586.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	780.5
		97.5% Chebyshev(Mean, Sd) UCL	914.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1178
95% Approximate Gamma UCL	649.7		
95% Adjusted Gamma UCL	697.2		

Potential UCL to Use		Use 95% Student's-t UCL	602.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_24	101-12-075	19	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics

Minimum	17.5
Maximum	211
Mean	77.34
Median	54.9
SD	61.62
Coefficient of Variation	0.797
Skewness	1.621

Log-transformed Statistics

Minimum of Log Data	2.862
Maximum of Log Data	5.352
Mean of log Data	4.104
SD of log Data	0.733

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.801
Shapiro Wilk Critical Value	0.829

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.957
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	115.5
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	123
95% Modified-t UCL	117.4

Assuming Lognormal Distribution

95% H-UCL	160.5
95% Chebyshev (MVUE) UCL	160.2
97.5% Chebyshev (MVUE) UCL	196.3
99% Chebyshev (MVUE) UCL	267.4

Gamma Distribution Test

k star (bias corrected)	1.543
Theta Star	50.13
nu star	27.77
Approximate Chi Square Value (.05)	16.75
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	14.97
Anderson-Darling Test Statistic	0.438
Anderson-Darling 5% Critical Value	0.729
Kolmogorov-Smirnov Test Statistic	0.223
Kolmogorov-Smirnov 5% Critical Value	0.282

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	111.1
95% Jackknife UCL	115.5
95% Standard Bootstrap UCL	108.3
95% Bootstrap-t UCL	180.4
95% Hall's Bootstrap UCL	336.4
95% Percentile Bootstrap UCL	110
95% BCA Bootstrap UCL	119.3
95% Chebyshev(Mean, Sd) UCL	166.9
97.5% Chebyshev(Mean, Sd) UCL	205.6
99% Chebyshev(Mean, Sd) UCL	281.7

Assuming Gamma Distribution

95% Approximate Gamma UCL	128.2
95% Adjusted Gamma UCL	143.5

Potential UCL to Use

Use 95% Approximate Gamma UCL 128.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_25	101-12-101A	19	Arsenic

General Statistics

Number of Valid Samples	9
Number of Unique Samples	7

Raw Statistics

Minimum	3.3
Maximum	10
Mean	5.222
Median	4.8
SD	1.892
Coefficient of Variation	0.362
Skewness	2.378

Log-transformed Statistics

Minimum of Log Data	1.194
Maximum of Log Data	2.303
Mean of log Data	1.609
SD of log Data	0.297

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.69
Shapiro Wilk Critical Value	0.829

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.813
Shapiro Wilk Critical Value	0.829

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	6.395
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	6.794
95% Modified-t UCL	6.478

Assuming Lognormal Distribution

95% H-UCL	6.459
95% Chebyshev (MVUE) UCL	7.452
97.5% Chebyshev (MVUE) UCL	8.429
99% Chebyshev (MVUE) UCL	10.35

Gamma Distribution Test

k star (bias corrected)	7.688
Theta Star	0.679
nu star	138.4
Approximate Chi Square Value (.05)	112.2
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	107.2
Anderson-Darling Test Statistic	1.008
Anderson-Darling 5% Critical Value	0.722
Kolmogorov-Smirnov Test Statistic	0.305
Kolmogorov-Smirnov 5% Critical Value	0.279

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	6.441
95% Adjusted Gamma UCL	6.739

Data Distribution

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

95% CLT UCL	6.26
95% Jackknife UCL	6.395
95% Standard Bootstrap UCL	6.21
95% Bootstrap-t UCL	7.797
95% Hall's Bootstrap UCL	11.29
95% Percentile Bootstrap UCL	6.433
95% BCA Bootstrap UCL	6.867
95% Chebyshev(Mean, Sd) UCL	7.971
97.5% Chebyshev(Mean, Sd) UCL	9.161
99% Chebyshev(Mean, Sd) UCL	11.5

Potential UCL to Use

Use 95% Student's-t UCL	6.395
or 95% Modified-t UCL	6.478

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_26	101-12-101A	19	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	265	Minimum of Log Data	5.58
Maximum	521	Maximum of Log Data	6.256
Mean	353.3	Mean of log Data	5.846
Median	355	SD of log Data	0.218
SD	81		
Coefficient of Variation	0.229		
Skewness	1.055		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.909	Shapiro Wilk Test Statistic	0.943
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	403.5	95% H-UCL	410.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	465.2
95% Adjusted-CLT UCL	407.9	97.5% Chebyshev (MVUE) UCL	513.7
95% Modified-t UCL	405.1	99% Chebyshev (MVUE) UCL	608.9

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	15.51	Data appear Normal at 5% Significance Level	
Theta Star	22.78		
nu star	279.2		
Approximate Chi Square Value (.05)	241.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	397.7
Adjusted Chi Square Value	234.1	95% Jackknife UCL	403.5
		95% Standard Bootstrap UCL	394.9
Anderson-Darling Test Statistic	0.295	95% Bootstrap-t UCL	422
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	451.4
Kolmogorov-Smirnov Test Statistic	0.163	95% Percentile Bootstrap UCL	395.8
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	404.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	471
		97.5% Chebyshev(Mean, Sd) UCL	522
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	622
95% Approximate Gamma UCL	408.5		
95% Adjusted Gamma UCL	421.4		

Potential UCL to Use		Use 95% Student's-t UCL	403.5

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_27	101-12-101A	19	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	79.6	Minimum of Log Data	4.377
Maximum	780	Maximum of Log Data	6.659
Mean	185.2	Mean of log Data	4.865
Median	95.7	SD of log Data	0.751
SD	228.5		
Coefficient of Variation	1.233		
Skewness	2.76		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.528	Shapiro Wilk Test Statistic	0.685
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	326.9	95% H-UCL	357.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	351.3
95% Adjusted-CLT UCL	385.4	97.5% Chebyshev (MVUE) UCL	431.6
95% Modified-t UCL	338.5	99% Chebyshev (MVUE) UCL	589.4

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.106	Data do not follow a Discernable Distribution (0.05)	
Theta Star	167.5		
nu star	19.91		
Approximate Chi Square Value (.05)	10.78	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	310.5
Adjusted Chi Square Value	9.4	95% Jackknife UCL	326.9
		95% Standard Bootstrap UCL	302.9
Anderson-Darling Test Statistic	1.591	95% Bootstrap-t UCL	2133
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	1119
Kolmogorov-Smirnov Test Statistic	0.409	95% Percentile Bootstrap UCL	324.2
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL	398.6
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	517.2
		97.5% Chebyshev(Mean, Sd) UCL	660.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	942.9
95% Approximate Gamma UCL	342		
95% Adjusted Gamma UCL	392.4		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	517.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_28	101-12-102	19	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	7

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.8	Minimum of Log Data	1.569
Maximum	6.8	Maximum of Log Data	1.917
Mean	5.644	Mean of log Data	1.725
Median	5.4	SD of log Data	0.108
SD	0.631		
Coefficient of Variation	0.112		
Skewness	0.933		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.882	Shapiro Wilk Test Statistic	0.901
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6.035	95% H-UCL	6.059
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.533
95% Adjusted-CLT UCL	6.06	97.5% Chebyshev (MVUE) UCL	6.917
95% Modified-t UCL	6.046	99% Chebyshev (MVUE) UCL	7.673

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	62.83	Data appear Normal at 5% Significance Level	
Theta Star	0.0898		
nu star	1131		
Approximate Chi Square Value (.05)	1054	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5.99
Adjusted Chi Square Value	1038	95% Jackknife UCL	6.035
		95% Standard Bootstrap UCL	5.97
Anderson-Darling Test Statistic	0.582	95% Bootstrap-t UCL	6.315
Anderson-Darling 5% Critical Value	0.72	95% Hall's Bootstrap UCL	8.861
Kolmogorov-Smirnov Test Statistic	0.252	95% Percentile Bootstrap UCL	5.967
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.561
		97.5% Chebyshev(Mean, Sd) UCL	6.957
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7.736
95% Approximate Gamma UCL	6.057		
95% Adjusted Gamma UCL	6.149		

Potential UCL to Use		Use 95% Student's-t UCL	6.035

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_29	101-12-102	19	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	229	Minimum of Log Data	5.434
Maximum	698	Maximum of Log Data	6.548
Mean	455.8	Mean of log Data	6.079
Median	450	SD of log Data	0.319
SD	135.8		
Coefficient of Variation	0.298		
Skewness	0.23		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.983	Shapiro Wilk Test Statistic	0.959
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	539.9	95% H-UCL	579.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	670.2
95% Adjusted-CLT UCL	533.9	97.5% Chebyshev (MVUE) UCL	762.5
95% Modified-t UCL	540.5	99% Chebyshev (MVUE) UCL	943.9

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.987	Data appear Normal at 5% Significance Level	
Theta Star	57.06		
nu star	143.8		
Approximate Chi Square Value (.05)	117.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	530.2
Adjusted Chi Square Value	112	95% Jackknife UCL	539.9
		95% Standard Bootstrap UCL	524.8
Anderson-Darling Test Statistic	0.198	95% Bootstrap-t UCL	547.1
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	557.2
Kolmogorov-Smirnov Test Statistic	0.136	95% Percentile Bootstrap UCL	526.3
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	527.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	653
		97.5% Chebyshev(Mean, Sd) UCL	738.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	906.1
95% Approximate Gamma UCL	559.8		
95% Adjusted Gamma UCL	585.2		

Potential UCL to Use		Use 95% Student's-t UCL	539.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_30	101-12-102	19	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	35.7	Minimum of Log Data	3.575
Maximum	360	Maximum of Log Data	5.886
Mean	161.5	Mean of log Data	4.916
Median	137	SD of log Data	0.654
SD	95.24		
Coefficient of Variation	0.59		
Skewness	1.093		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Test Statistic	0.95
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	220.6	95% H-UCL	306.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	324.4
95% Adjusted-CLT UCL	226.1	97.5% Chebyshev (MVUE) UCL	393.6
95% Modified-t UCL	222.5	99% Chebyshev (MVUE) UCL	529.5

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.158	Data appear Normal at 5% Significance Level	
Theta Star	74.83		
nu star	38.85		
Approximate Chi Square Value (.05)	25.58	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	213.7
Adjusted Chi Square Value	23.33	95% Jackknife UCL	220.6
		95% Standard Bootstrap UCL	209.8
Anderson-Darling Test Statistic	0.213	95% Bootstrap-t UCL	249.7
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	379.6
Kolmogorov-Smirnov Test Statistic	0.147	95% Percentile Bootstrap UCL	214.4
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	223.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	299.9
		97.5% Chebyshev(Mean, Sd) UCL	359.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	477.4
95% Approximate Gamma UCL	245.4		
95% Adjusted Gamma UCL	269		

Potential UCL to Use		Use 95% Student's-t UCL	220.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_31	101-12-093	20	Arsenic

General Statistics

Number of Valid Samples	11	Number of Unique Samples	10

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.1	Minimum of Log Data	1.131
Maximum	12.4	Maximum of Log Data	2.518
Mean	6	Mean of log Data	1.715
Median	5.5	SD of log Data	0.403
SD	2.614		
Coefficient of Variation	0.436		
Skewness	1.47		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.876	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	7.429	95% H-UCL	7.837
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9.192
95% Adjusted-CLT UCL	7.67	97.5% Chebyshev (MVUE) UCL	10.58
95% Modified-t UCL	7.487	99% Chebyshev (MVUE) UCL	13.31

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.943	Data appear Normal at 5% Significance Level	
Theta Star	1.214		
nu star	108.7		
Approximate Chi Square Value (.05)	85.67	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	7.296
Adjusted Chi Square Value	82.34	95% Jackknife UCL	7.429
		95% Standard Bootstrap UCL	7.26
Anderson-Darling Test Statistic	0.259	95% Bootstrap-t UCL	8.179
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	12.71
Kolmogorov-Smirnov Test Statistic	0.121	95% Percentile Bootstrap UCL	7.291
Kolmogorov-Smirnov 5% Critical Value	0.256	95% BCA Bootstrap UCL	7.482
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9.436
		97.5% Chebyshev(Mean, Sd) UCL	10.92
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	13.84
95% Approximate Gamma UCL	7.616		
95% Adjusted Gamma UCL	7.924		

Potential UCL to Use		Use 95% Student's-t UCL	7.429

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_32	101-12-093	20	Copper

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	314	Minimum of Log Data	5.749
Maximum	1990	Maximum of Log Data	7.596
Mean	752.4	Mean of log Data	6.485
Median	637	SD of log Data	0.522
SD	475.2		
Coefficient of Variation	0.632		
Skewness	2.022		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.787	Shapiro Wilk Test Statistic	0.956
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	1012	95% H-UCL	1083
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1262
95% Adjusted-CLT UCL	1081	97.5% Chebyshev (MVUE) UCL	1487
95% Modified-t UCL	1027	99% Chebyshev (MVUE) UCL	1929

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.814	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	267.4		
nu star	61.9		
Approximate Chi Square Value (.05)	44.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	988.1
Adjusted Chi Square Value	42.44	95% Jackknife UCL	1012
		95% Standard Bootstrap UCL	975.9
Anderson-Darling Test Statistic	0.415	95% Bootstrap-t UCL	1265
Anderson-Darling 5% Critical Value	0.733	95% Hall's Bootstrap UCL	2119
Kolmogorov-Smirnov Test Statistic	0.169	95% Percentile Bootstrap UCL	996.6
Kolmogorov-Smirnov 5% Critical Value	0.257	95% BCA Bootstrap UCL	1083
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1377
		97.5% Chebyshev(Mean, Sd) UCL	1647
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2178
95% Approximate Gamma UCL	1039		
95% Adjusted Gamma UCL	1097		

Potential UCL to Use		Use 95% Approximate Gamma UCL	1039

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_33	101-12-093	20	Lead

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	36.6	Minimum of Log Data	3.6
Maximum	176	Maximum of Log Data	5.17
Mean	79.8	Mean of log Data	4.288
Median	73.1	SD of log Data	0.437
SD	38.98		
Coefficient of Variation	0.488		
Skewness	1.63		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.858	Shapiro Wilk Test Statistic	0.973
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	101.1	95% H-UCL	107.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	125.7
95% Adjusted-CLT UCL	105.3	97.5% Chebyshev (MVUE) UCL	145.8
95% Modified-t UCL	102.1	99% Chebyshev (MVUE) UCL	185.1

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.139	Data appear Normal at 5% Significance Level	
Theta Star	19.28		
nu star	91.05		
Approximate Chi Square Value (.05)	70.05	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	99.13
Adjusted Chi Square Value	67.05	95% Jackknife UCL	101.1
		95% Standard Bootstrap UCL	98.42
Anderson-Darling Test Statistic	0.289	95% Bootstrap-t UCL	114.9
Anderson-Darling 5% Critical Value	0.731	95% Hall's Bootstrap UCL	204.7
Kolmogorov-Smirnov Test Statistic	0.135	95% Percentile Bootstrap UCL	100.4
Kolmogorov-Smirnov 5% Critical Value	0.256	95% BCA Bootstrap UCL	105.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	131
		97.5% Chebyshev(Mean, Sd) UCL	153.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	196.7
95% Approximate Gamma UCL	103.7		
95% Adjusted Gamma UCL	108.4		

Potential UCL to Use		Use 95% Student's-t UCL	101.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_34	101-12-094A	20	Arsenic

General Statistics

Number of Valid Samples	11	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	1.9	Minimum of Log Data	0.642
Maximum	15.5	Maximum of Log Data	2.741
Mean	5.445	Mean of log Data	1.515
Median	4.9	SD of log Data	0.599
SD	3.91		
Coefficient of Variation	0.718		
Skewness	1.978		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.78	Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	7.582	95% H-UCL	8.447
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	9.674
95% Adjusted-CLT UCL	8.136	97.5% Chebyshev (MVUE) UCL	11.55
95% Modified-t UCL	7.699	99% Chebyshev (MVUE) UCL	15.23

Gamma Distribution Test		Data Distribution
k star (bias corrected)	2.198	Data appear Gamma Distributed at 5% Significance Level
Theta Star	2.477	
nu star	48.36	
Approximate Chi Square Value (.05)	33.4	**Nonparametric Statistics**
Adjusted Level of Significance	0.0278	95% CLT UCL 7.385
Adjusted Chi Square Value	31.38	95% Jackknife UCL 7.582
		95% Standard Bootstrap UCL 7.312
Anderson-Darling Test Statistic	0.462	95% Bootstrap-t UCL 10.33
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL 17.18
Kolmogorov-Smirnov Test Statistic	0.219	95% Percentile Bootstrap UCL 7.536
Kolmogorov-Smirnov 5% Critical Value	0.257	95% BCA Bootstrap UCL 8.136
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 10.58
		97.5% Chebyshev(Mean, Sd) UCL 12.81
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 17.18
95% Approximate Gamma UCL	7.885	
95% Adjusted Gamma UCL	8.392	

Potential UCL to Use	Use 95% Approximate Gamma UCL	7.885

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_35	101-12-094A	20	Copper

General Statistics

Number of Valid Samples	11
Number of Unique Samples	11

Raw Statistics

Minimum	208
Maximum	1050
Mean	494.9
Median	442
SD	250.3
Coefficient of Variation	0.506
Skewness	1.181

Log-transformed Statistics

Minimum of Log Data	5.338
Maximum of Log Data	6.957
Mean of log Data	6.097
SD of log Data	0.484

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.903
Shapiro Wilk Critical Value	0.85

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.982
Shapiro Wilk Critical Value	0.85

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	631.7
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	647.8
95% Modified-t UCL	636.2

Assuming Lognormal Distribution

95% H-UCL	694.8
95% Chebyshev (MVUE) UCL	813.7
97.5% Chebyshev (MVUE) UCL	952.2
99% Chebyshev (MVUE) UCL	1224

Gamma Distribution Test

k star (bias corrected)	3.55
Theta Star	139.4
nu star	78.1
Approximate Chi Square Value (.05)	58.74
Adjusted Level of Significance	0.0278
Adjusted Chi Square Value	56.01
Anderson-Darling Test Statistic	0.21
Anderson-Darling 5% Critical Value	0.732
Kolmogorov-Smirnov Test Statistic	0.13
Kolmogorov-Smirnov 5% Critical Value	0.256

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	619.1
95% Jackknife UCL	631.7
95% Standard Bootstrap UCL	613.3
95% Bootstrap-t UCL	708.3
95% Hall's Bootstrap UCL	867.2
95% Percentile Bootstrap UCL	622.3
95% BCA Bootstrap UCL	646.5
95% Chebyshev(Mean, Sd) UCL	823.9
97.5% Chebyshev(Mean, Sd) UCL	966.3
99% Chebyshev(Mean, Sd) UCL	1246

Assuming Gamma Distribution

95% Approximate Gamma UCL	658
95% Adjusted Gamma UCL	690.1

Potential UCL to Use

Use 95% Student's-t UCL 631.7

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_36	101-12-094A	20	Lead

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	21.1	Minimum of Log Data	3.049
Maximum	116	Maximum of Log Data	4.754
Mean	74.61	Mean of log Data	4.195
Median	80.9	SD of log Data	0.559
SD	31.47		
Coefficient of Variation	0.422		
Skewness	-0.612		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.913	Shapiro Wilk Test Statistic	0.834
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	91.81	95% H-UCL	115.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	133.9
95% Adjusted-CLT UCL	88.34	97.5% Chebyshev (MVUE) UCL	158.8
95% Modified-t UCL	91.51	99% Chebyshev (MVUE) UCL	207.7

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.291	Data appear Normal at 5% Significance Level	
Theta Star	22.67		
nu star	72.4		
Approximate Chi Square Value (.05)	53.81	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	90.21
Adjusted Chi Square Value	51.2	95% Jackknife UCL	91.81
		95% Standard Bootstrap UCL	89.43
Anderson-Darling Test Statistic	0.761	95% Bootstrap-t UCL	89.92
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL	87.98
Kolmogorov-Smirnov Test Statistic	0.285	95% Percentile Bootstrap UCL	88.82
Kolmogorov-Smirnov 5% Critical Value	0.256	95% BCA Bootstrap UCL	88.11
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	116
		97.5% Chebyshev(Mean, Sd) UCL	133.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	169
95% Approximate Gamma UCL	100.4		
95% Adjusted Gamma UCL	105.5		

Potential UCL to Use		Use 95% Student's-t UCL	91.81

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_37	101-12-108	20	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics

		Log-transformed Statistics	
Minimum	3.1	Minimum of Log Data	1.131
Maximum	7.8	Maximum of Log Data	2.054
Mean	5.2	Mean of log Data	1.616
Median	4.8	SD of log Data	0.271
SD	1.393		
Coefficient of Variation	0.268		
Skewness	0.501		

Relevant UCL Statistics

Normal Distribution Test

		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.978	Shapiro Wilk Test Statistic	0.988
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution

		Assuming Lognormal Distribution	
95% Student's-t UCL	6.063	95% H-UCL	6.324
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7.261
95% Adjusted-CLT UCL	6.046	97.5% Chebyshev (MVUE) UCL	8.152
95% Modified-t UCL	6.076	99% Chebyshev (MVUE) UCL	9.902

Gamma Distribution Test

		Data Distribution	
k star (bias corrected)	10.54	Data appear Normal at 5% Significance Level	
Theta Star	0.493		
nu star	189.8		
Approximate Chi Square Value (.05)	158.9	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5.964
Adjusted Chi Square Value	152.9	95% Jackknife UCL	6.063
		95% Standard Bootstrap UCL	5.913
Anderson-Darling Test Statistic	0.153	95% Bootstrap-t UCL	6.158
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	6.274
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	5.956
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	5.944
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7.224
		97.5% Chebyshev(Mean, Sd) UCL	8.099
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9.82
95% Approximate Gamma UCL	6.21		
95% Adjusted Gamma UCL	6.452		

Potential UCL to Use		Use 95% Student's-t UCL	6.063

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_38	101-12-108	20	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	199	Minimum of Log Data	5.293
Maximum	734	Maximum of Log Data	6.599
Mean	435.6	Mean of log Data	5.986
Median	428	SD of log Data	0.463
SD	189.4		
Coefficient of Variation	0.435		
Skewness	0.39		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.929	Shapiro Wilk Test Statistic	0.935
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	553	95% H-UCL	639.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	734.8
95% Adjusted-CLT UCL	548.2	97.5% Chebyshev (MVUE) UCL	863.6
95% Modified-t UCL	554.3	99% Chebyshev (MVUE) UCL	1117

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.859	Data appear Normal at 5% Significance Level	
Theta Star	112.9		
nu star	69.46		
Approximate Chi Square Value (.05)	51.28	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	539.4
Adjusted Chi Square Value	48	95% Jackknife UCL	553
		95% Standard Bootstrap UCL	533.4
Anderson-Darling Test Statistic	0.287	95% Bootstrap-t UCL	568
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	588.4
Kolmogorov-Smirnov Test Statistic	0.146	95% Percentile Bootstrap UCL	536.2
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	536.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	710.8
		97.5% Chebyshev(Mean, Sd) UCL	829.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1064
95% Approximate Gamma UCL	590		
95% Adjusted Gamma UCL	630.3		

Potential UCL to Use		Use 95% Student's-t UCL	553

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_39	101-12-108	20	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	19.7	Minimum of Log Data	2.981
Maximum	205	Maximum of Log Data	5.323
Mean	85.6	Mean of log Data	4.172
Median	63.2	SD of log Data	0.839
SD	62.07		
Coefficient of Variation	0.725		
Skewness	0.783		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.905	Shapiro Wilk Test Statistic	0.924
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	124.1	95% H-UCL	220.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	198.2
95% Adjusted-CLT UCL	125.4	97.5% Chebyshev (MVUE) UCL	246
95% Modified-t UCL	125	99% Chebyshev (MVUE) UCL	339.8

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.374	Data appear Normal at 5% Significance Level	
Theta Star	62.29		
nu star	24.74		
Approximate Chi Square Value (.05)	14.41	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	119.6
Adjusted Chi Square Value	12.78	95% Jackknife UCL	124.1
		95% Standard Bootstrap UCL	118
Anderson-Darling Test Statistic	0.313	95% Bootstrap-t UCL	136.1
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	125.6
Kolmogorov-Smirnov Test Statistic	0.188	95% Percentile Bootstrap UCL	119.7
Kolmogorov-Smirnov 5% Critical Value	0.283	95% BCA Bootstrap UCL	122.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	175.8
		97.5% Chebyshev(Mean, Sd) UCL	214.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	291.5
95% Approximate Gamma UCL	146.9		
95% Adjusted Gamma UCL	165.7		

Potential UCL to Use		Use 95% Student's-t UCL	124.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_40	101-12-130	21	Arsenic

General Statistics

Number of Valid Samples	11	Number of Unique Samples	10

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.4	Minimum of Log Data	0.875
Maximum	6.8	Maximum of Log Data	1.917
Mean	4.764	Mean of log Data	1.529
Median	4.6	SD of log Data	0.276
SD	1.186		
Coefficient of Variation	0.249		
Skewness	-0.134		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.955	Shapiro Wilk Test Statistic	0.904
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	5.412	95% H-UCL	5.67
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.518
95% Adjusted-CLT UCL	5.336	97.5% Chebyshev (MVUE) UCL	7.271
95% Modified-t UCL	5.409	99% Chebyshev (MVUE) UCL	8.752

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	11.6	Data appear Normal at 5% Significance Level	
Theta Star	0.411		
nu star	255.3		
Approximate Chi Square Value (.05)	219.3	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	5.352
Adjusted Chi Square Value	213.8	95% Jackknife UCL	5.412
		95% Standard Bootstrap UCL	5.332
Anderson-Darling Test Statistic	0.401	95% Bootstrap-t UCL	5.421
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	5.507
Kolmogorov-Smirnov Test Statistic	0.171	95% Percentile Bootstrap UCL	5.291
Kolmogorov-Smirnov 5% Critical Value	0.255	95% BCA Bootstrap UCL	5.264
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.322
		97.5% Chebyshev(Mean, Sd) UCL	6.997
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	8.322
95% Approximate Gamma UCL	5.546		
95% Adjusted Gamma UCL	5.687		

Potential UCL to Use		Use 95% Student's-t UCL	5.412

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_41	101-12-130	21	Copper

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	322	Minimum of Log Data	5.775
Maximum	930	Maximum of Log Data	6.835
Mean	659.2	Mean of log Data	6.427
Median	680	SD of log Data	0.385
SD	233.4		
Coefficient of Variation	0.354		
Skewness	-0.0968		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.879	Shapiro Wilk Test Statistic	0.887
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	786.7	95% H-UCL	853.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1000
95% Adjusted-CLT UCL	772.7	97.5% Chebyshev (MVUE) UCL	1147
95% Modified-t UCL	786.4	99% Chebyshev (MVUE) UCL	1435

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.895	Data appear Normal at 5% Significance Level	
Theta Star	111.8		
nu star	129.7		
Approximate Chi Square Value (.05)	104.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	774.9
Adjusted Chi Square Value	100.7	95% Jackknife UCL	786.7
		95% Standard Bootstrap UCL	767.3
Anderson-Darling Test Statistic	0.585	95% Bootstrap-t UCL	783.7
Anderson-Darling 5% Critical Value	0.73	95% Hall's Bootstrap UCL	757
Kolmogorov-Smirnov Test Statistic	0.226	95% Percentile Bootstrap UCL	773.4
Kolmogorov-Smirnov 5% Critical Value	0.256	95% BCA Bootstrap UCL	771.5
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	965.9
		97.5% Chebyshev(Mean, Sd) UCL	1099
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1359
95% Approximate Gamma UCL	819		
95% Adjusted Gamma UCL	849.1		

Potential UCL to Use		Use 95% Student's-t UCL	786.7

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_42	101-12-130	21	Lead

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	31.4	Minimum of Log Data	3.447
Maximum	156	Maximum of Log Data	5.05
Mean	81.46	Mean of log Data	4.278
Median	57	SD of log Data	0.523
SD	41.85		
Coefficient of Variation	0.514		
Skewness	0.619		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.899	Shapiro Wilk Test Statistic	0.937
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	104.3	95% H-UCL	119.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	138.8
95% Adjusted-CLT UCL	104.7	97.5% Chebyshev (MVUE) UCL	163.6
95% Modified-t UCL	104.7	99% Chebyshev (MVUE) UCL	212.2

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.151	Data appear Normal at 5% Significance Level	
Theta Star	25.85		
nu star	69.33		
Approximate Chi Square Value (.05)	51.16	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	102.2
Adjusted Chi Square Value	48.62	95% Jackknife UCL	104.3
		95% Standard Bootstrap UCL	101.1
Anderson-Darling Test Statistic	0.45	95% Bootstrap-t UCL	108.3
Anderson-Darling 5% Critical Value	0.732	95% Hall's Bootstrap UCL	101.3
Kolmogorov-Smirnov Test Statistic	0.247	95% Percentile Bootstrap UCL	101.4
Kolmogorov-Smirnov 5% Critical Value	0.256	95% BCA Bootstrap UCL	103.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	136.5
		97.5% Chebyshev(Mean, Sd) UCL	160.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	207
95% Approximate Gamma UCL	110.4		
95% Adjusted Gamma UCL	116.1		

Potential UCL to Use		Use 95% Student's-t UCL	104.3

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_43	101-12-142	21	Arsenic

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.7	Minimum of Log Data	0.993
Maximum	34.1	Maximum of Log Data	3.529
Mean	11.07	Mean of log Data	2.188
Median	9.5	SD of log Data	0.694
SD	8.451		
Coefficient of Variation	0.763		
Skewness	2.238		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.757	Shapiro Wilk Test Statistic	0.936
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	15.69	95% H-UCL	19.47
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	21.5
95% Adjusted-CLT UCL	17.1	97.5% Chebyshev (MVUE) UCL	26.01
95% Modified-t UCL	15.98	99% Chebyshev (MVUE) UCL	34.89

Gamma Distribution Test		**Data Distribution**
k star (bias corrected)	1.85	Data appear Gamma Distributed at 5% Significance Level
Theta Star	5.986	
nu star	40.69	
Approximate Chi Square Value (.05)	27.08	**Nonparametric Statistics**
Adjusted Level of Significance	0.0278	95% CLT UCL 15.26
Adjusted Chi Square Value	25.28	95% Jackknife UCL 15.69
		95% Standard Bootstrap UCL 15.16
Anderson-Darling Test Statistic	0.443	95% Bootstrap-t UCL 19.64
Anderson-Darling 5% Critical Value	0.736	95% Hall's Bootstrap UCL 34.77
Kolmogorov-Smirnov Test Statistic	0.178	95% Percentile Bootstrap UCL 15.34
Kolmogorov-Smirnov 5% Critical Value	0.258	95% BCA Bootstrap UCL 16.88
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL 22.18
		97.5% Chebyshev(Mean, Sd) UCL 26.99
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL 36.43
95% Approximate Gamma UCL	16.64	
95% Adjusted Gamma UCL	17.83	

Potential UCL to Use		Use 95% Approximate Gamma UCL	16.64

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_44	101-12-142	21	Copper

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	148	Minimum of Log Data	4.997
Maximum	1970	Maximum of Log Data	7.586
Mean	1088	Mean of log Data	6.791
Median	1170	SD of log Data	0.779
SD	558		
Coefficient of Variation	0.513		
Skewness	-0.31		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Test Statistic	0.836
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	1393	95% H-UCL	2290
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2411
95% Adjusted-CLT UCL	1348	97.5% Chebyshev (MVUE) UCL	2949
95% Modified-t UCL	1390	99% Chebyshev (MVUE) UCL	4008

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.98	Data appear Normal at 5% Significance Level	
Theta Star	549.6		
nu star	43.55		
Approximate Chi Square Value (.05)	29.42	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	1365
Adjusted Chi Square Value	27.54	95% Jackknife UCL	1393
		95% Standard Bootstrap UCL	1355
Anderson-Darling Test Statistic	0.599	95% Bootstrap-t UCL	1384
Anderson-Darling 5% Critical Value	0.735	95% Hall's Bootstrap UCL	1357
Kolmogorov-Smirnov Test Statistic	0.253	95% Percentile Bootstrap UCL	1357
Kolmogorov-Smirnov 5% Critical Value	0.258	95% BCA Bootstrap UCL	1331
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1821
		97.5% Chebyshev(Mean, Sd) UCL	2139
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2762
95% Approximate Gamma UCL	1611		
95% Adjusted Gamma UCL	1721		

Potential UCL to Use		Use 95% Student's-t UCL	1393

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_45	101-12-142	21	Lead

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics

Minimum	58.9
Maximum	577
Mean	293.1
Median	295
SD	171.4
Coefficient of Variation	0.585
Skewness	0.324

Log-transformed Statistics

Minimum of Log Data	4.076
Maximum of Log Data	6.358
Mean of log Data	5.474
SD of log Data	0.742

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.937
Shapiro Wilk Critical Value	0.85

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.905
Shapiro Wilk Critical Value	0.85

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	386.8
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	383.5
95% Modified-t UCL	387.6

Assuming Lognormal Distribution

95% H-UCL	569.5
95% Chebyshev (MVUE) UCL	613.4
97.5% Chebyshev (MVUE) UCL	747
99% Chebyshev (MVUE) UCL	1009

Gamma Distribution Test

k star (bias corrected)	1.933
Theta Star	151.6
nu star	42.53
Approximate Chi Square Value (.05)	28.58
Adjusted Level of Significance	0.0278
Adjusted Chi Square Value	26.73
Anderson-Darling Test Statistic	0.338
Anderson-Darling 5% Critical Value	0.736
Kolmogorov-Smirnov Test Statistic	0.152
Kolmogorov-Smirnov 5% Critical Value	0.258

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	436.2
95% Adjusted Gamma UCL	466.4

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	378.1
95% Jackknife UCL	386.8
95% Standard Bootstrap UCL	373
95% Bootstrap-t UCL	395.9
95% Hall's Bootstrap UCL	383.2
95% Percentile Bootstrap UCL	372.6
95% BCA Bootstrap UCL	383.1
95% Chebyshev(Mean, Sd) UCL	518.3
97.5% Chebyshev(Mean, Sd) UCL	615.8
99% Chebyshev(Mean, Sd) UCL	807.2

Potential UCL to Use

Use 95% Student's-t UCL 386.8

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_46	101-12-149	21	Arsenic

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.9	Minimum of Log Data	1.361
Maximum	82.7	Maximum of Log Data	4.415
Mean	15.07	Mean of log Data	2.196
Median	7.2	SD of log Data	0.892
SD	23.02		
Coefficient of Variation	1.527		
Skewness	3.038		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.517	Shapiro Wilk Test Statistic	0.828
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	27.65	95% H-UCL	29.54
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	28.54
95% Adjusted-CLT UCL	33.28	97.5% Chebyshev (MVUE) UCL	35.36
95% Modified-t UCL	28.71	99% Chebyshev (MVUE) UCL	48.76

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.863	Data do not follow a Discernable Distribution (0.05)	
Theta Star	17.46		
nu star	18.99		
Approximate Chi Square Value (.05)	10.11	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	26.49
Adjusted Chi Square Value	9.072	95% Jackknife UCL	27.65
		95% Standard Bootstrap UCL	25.95
Anderson-Darling Test Statistic	1.302	95% Bootstrap-t UCL	97.51
Anderson-Darling 5% Critical Value	0.75	95% Hall's Bootstrap UCL	77.55
Kolmogorov-Smirnov Test Statistic	0.303	95% Percentile Bootstrap UCL	27.89
Kolmogorov-Smirnov 5% Critical Value	0.262	95% BCA Bootstrap UCL	35.28
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	45.33
		97.5% Chebyshev(Mean, Sd) UCL	58.42
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	84.14
95% Approximate Gamma UCL	28.31		
95% Adjusted Gamma UCL	31.55		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	45.33

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_47	101-12-149	21	Copper

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		Log-transformed Statistics	
Minimum	383	Minimum of Log Data	5.948
Maximum	9190	Maximum of Log Data	9.126
Mean	1726	Mean of log Data	6.889
Median	629	SD of log Data	0.964
SD	2593		
Coefficient of Variation	1.503		
Skewness	2.848		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.562	Shapiro Wilk Test Statistic	0.85
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	3143	95% H-UCL	3826
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3454
95% Adjusted-CLT UCL	3729	97.5% Chebyshev (MVUE) UCL	4310
95% Modified-t UCL	3255	99% Chebyshev (MVUE) UCL	5991
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.803	Data do not follow a Discernable Distribution (0.05)	
Theta Star	2150		
nu star	17.66		
Approximate Chi Square Value (.05)	9.143	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	3012
Adjusted Chi Square Value	8.162	95% Jackknife UCL	3143
		95% Standard Bootstrap UCL	2979
Anderson-Darling Test Statistic	1.156	95% Bootstrap-t UCL	8484
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	7821
Kolmogorov-Smirnov Test Statistic	0.265	95% Percentile Bootstrap UCL	3155
Kolmogorov-Smirnov 5% Critical Value	0.262	95% BCA Bootstrap UCL	4163
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5134
		97.5% Chebyshev(Mean, Sd) UCL	6609
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9506
95% Approximate Gamma UCL	3332		
95% Adjusted Gamma UCL	3733		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	5134

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_48	101-12-149	21	Lead

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	35.9	Minimum of Log Data	3.581
Maximum	2330	Maximum of Log Data	7.754
Mean	327.2	Mean of log Data	4.895
Median	88.5	SD of log Data	1.135
SD	673.4		
Coefficient of Variation	2.058		
Skewness	3.166		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.456	Shapiro Wilk Test Statistic	0.804
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	695.2	95% H-UCL	825.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	606.5
95% Adjusted-CLT UCL	868.3	97.5% Chebyshev (MVUE) UCL	767.8
95% Modified-t UCL	727.5	99% Chebyshev (MVUE) UCL	1084

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.554	Data do not follow a Discernable Distribution (0.05)	
Theta Star	591.1		
nu star	12.18		
Approximate Chi Square Value (.05)	5.345	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	661.2
Adjusted Chi Square Value	4.628	95% Jackknife UCL	695.2
		95% Standard Bootstrap UCL	658.4
Anderson-Darling Test Statistic	1.72	95% Bootstrap-t UCL	5042
Anderson-Darling 5% Critical Value	0.768	95% Hall's Bootstrap UCL	2502
Kolmogorov-Smirnov Test Statistic	0.357	95% Percentile Bootstrap UCL	710
Kolmogorov-Smirnov 5% Critical Value	0.266	95% BCA Bootstrap UCL	943.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1212
		97.5% Chebyshev(Mean, Sd) UCL	1595
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	2347
95% Approximate Gamma UCL	745.5		
95% Adjusted Gamma UCL	861		

Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	2347
Recommended UCL exceeds the maximum observation			

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_49	101-12-150	21	Arsenic

General Statistics

Number of Valid Samples	11	Number of Unique Samples	10

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.2	Minimum of Log Data	1.163
Maximum	55.9	Maximum of Log Data	4.024
Mean	19.4	Mean of log Data	2.528
Median	11.7	SD of log Data	0.991
SD	18.97		
Coefficient of Variation	0.978		
Skewness	1.249		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.8	Shapiro Wilk Test Statistic	0.939
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	29.77	95% H-UCL	52.26
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	45.86
95% Adjusted-CLT UCL	31.11	97.5% Chebyshev (MVUE) UCL	57.37
95% Modified-t UCL	30.12	99% Chebyshev (MVUE) UCL	79.97

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.994	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	19.51		
nu star	21.88		
Approximate Chi Square Value (.05)	12.25	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	28.81
Adjusted Chi Square Value	11.09	95% Jackknife UCL	29.77
		95% Standard Bootstrap UCL	28.58
Anderson-Darling Test Statistic	0.431	95% Bootstrap-t UCL	39.49
Anderson-Darling 5% Critical Value	0.746	95% Hall's Bootstrap UCL	35.08
Kolmogorov-Smirnov Test Statistic	0.158	95% Percentile Bootstrap UCL	29.36
Kolmogorov-Smirnov 5% Critical Value	0.261	95% BCA Bootstrap UCL	30.81
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	44.33
		97.5% Chebyshev(Mean, Sd) UCL	55.12
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	76.3
95% Approximate Gamma UCL	34.66		
95% Adjusted Gamma UCL	38.28		

Potential UCL to Use		Use 95% Approximate Gamma UCL	34.66

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_50	101-12-150	21	Copper

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		**Log-transformed Statistics**	
Minimum	632	Minimum of Log Data	6.449
Maximum	6790	Maximum of Log Data	8.823
Mean	3230	Mean of log Data	7.822
Median	2350	SD of log Data	0.815
SD	2157		
Coefficient of Variation	0.668		
Skewness	0.439		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.913	Shapiro Wilk Test Statistic	0.921
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4408	95% H-UCL	6918
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7106
95% Adjusted-CLT UCL	4391	97.5% Chebyshev (MVUE) UCL	8731
95% Modified-t UCL	4422	99% Chebyshev (MVUE) UCL	11924

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.579	Data appear Normal at 5% Significance Level	
Theta Star	2046		
nu star	34.73		
Approximate Chi Square Value (.05)	22.25	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	4299
Adjusted Chi Square Value	20.63	95% Jackknife UCL	4408
		95% Standard Bootstrap UCL	4252
Anderson-Darling Test Statistic	0.311	95% Bootstrap-t UCL	4639
Anderson-Darling 5% Critical Value	0.738	95% Hall's Bootstrap UCL	4288
Kolmogorov-Smirnov Test Statistic	0.155	95% Percentile Bootstrap UCL	4271
Kolmogorov-Smirnov 5% Critical Value	0.258	95% BCA Bootstrap UCL	4358
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6064
		97.5% Chebyshev(Mean, Sd) UCL	7290
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9700
95% Approximate Gamma UCL	5041		
95% Adjusted Gamma UCL	5436		

Potential UCL to Use		Use 95% Student's-t UCL	4408

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_51	101-12-150	21	Lead

General Statistics

Number of Valid Samples	11	Number of Unique Samples	11

Raw Statistics		Log-transformed Statistics	
Minimum	59.5	Minimum of Log Data	4.086
Maximum	1160	Maximum of Log Data	7.056
Mean	343.3	Mean of log Data	5.363
Median	145	SD of log Data	1.011
SD	357.2		
Coefficient of Variation	1.041		
Skewness	1.395		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.775	Shapiro Wilk Test Statistic	0.885
Shapiro Wilk Critical Value	0.85	Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	538.6	95% H-UCL	935.7
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	803.7
95% Adjusted-CLT UCL	568.9	97.5% Chebyshev (MVUE) UCL	1007
95% Modified-t UCL	546.1	99% Chebyshev (MVUE) UCL	1406

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.925	Data appear Lognormal at 5% Significance Level	
Theta Star	371		
nu star	20.36		
Approximate Chi Square Value (.05)	11.12	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0278	95% CLT UCL	520.5
Adjusted Chi Square Value	10.02	95% Jackknife UCL	538.6
		95% Standard Bootstrap UCL	512.7
Anderson-Darling Test Statistic	0.827	95% Bootstrap-t UCL	685.4
Anderson-Darling 5% Critical Value	0.748	95% Hall's Bootstrap UCL	533.4
Kolmogorov-Smirnov Test Statistic	0.276	95% Percentile Bootstrap UCL	523.9
Kolmogorov-Smirnov 5% Critical Value	0.261	95% BCA Bootstrap UCL	553.6
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	812.8
		97.5% Chebyshev(Mean, Sd) UCL	1016
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1415
95% Approximate Gamma UCL	628.8		
95% Adjusted Gamma UCL	697.6		

Potential UCL to Use		Use 95% Chebyshev (MVUE) UCL	803.7

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_52	101-12-136	22	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.5	Minimum of Log Data	0.916
Maximum	6.8	Maximum of Log Data	1.917
Mean	4.167	Mean of log Data	1.386
Median	4.1	SD of log Data	0.302
SD	1.296		
Coefficient of Variation	0.311		
Skewness	0.914		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.947	Shapiro Wilk Test Statistic	0.989
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4.97	95% H-UCL	5.199
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.003
95% Adjusted-CLT UCL	5.018	97.5% Chebyshev (MVUE) UCL	6.798
95% Modified-t UCL	4.992	99% Chebyshev (MVUE) UCL	8.361

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	8.301	Data appear Normal at 5% Significance Level	
Theta Star	0.502		
nu star	149.4		
Approximate Chi Square Value (.05)	122.2	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4.877
Adjusted Chi Square Value	117	95% Jackknife UCL	4.97
		95% Standard Bootstrap UCL	4.836
Anderson-Darling Test Statistic	0.164	95% Bootstrap-t UCL	5.23
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	5.511
Kolmogorov-Smirnov Test Statistic	0.134	95% Percentile Bootstrap UCL	4.833
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	4.911
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.05
		97.5% Chebyshev(Mean, Sd) UCL	6.865
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	8.466
95% Approximate Gamma UCL	5.096		
95% Adjusted Gamma UCL	5.323		

Potential UCL to Use		Use 95% Student's-t UCL	4.97

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_53	101-12-136	22	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	178	Minimum of Log Data	5.182
Maximum	620	Maximum of Log Data	6.43
Mean	304.3	Mean of log Data	5.65
Median	261	SD of log Data	0.373
SD	133.8		
Coefficient of Variation	0.439		
Skewness	1.897		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.795	Shapiro Wilk Test Statistic	0.912
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	387.2	95% H-UCL	402.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	467.4
95% Adjusted-CLT UCL	407.8	97.5% Chebyshev (MVUE) UCL	538.9
95% Modified-t UCL	391.9	99% Chebyshev (MVUE) UCL	679.3

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	5.059	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	60.15		
nu star	91.07		
Approximate Chi Square Value (.05)	70.06	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	377.7
Adjusted Chi Square Value	66.19	95% Jackknife UCL	387.2
		95% Standard Bootstrap UCL	372.2
Anderson-Darling Test Statistic	0.539	95% Bootstrap-t UCL	454.9
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	659.5
Kolmogorov-Smirnov Test Statistic	0.275	95% Percentile Bootstrap UCL	380.2
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	399.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	498.7
		97.5% Chebyshev(Mean, Sd) UCL	582.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	747.9
95% Approximate Gamma UCL	395.6		
95% Adjusted Gamma UCL	418.7		

Potential UCL to Use		Use 95% Approximate Gamma UCL	395.6

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_54	101-12-136	22	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	17	Minimum of Log Data	2.833
Maximum	100	Maximum of Log Data	4.605
Mean	51.26	Mean of log Data	3.851
Median	50.1	SD of log Data	0.464
SD	21.87		
Coefficient of Variation	0.427		
Skewness	1.136		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.862	Shapiro Wilk Test Statistic	0.864
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	64.81	95% H-UCL	75.64
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	86.94
95% Adjusted-CLT UCL	66.2	97.5% Chebyshev (MVUE) UCL	102.2
95% Modified-t UCL	65.27	99% Chebyshev (MVUE) UCL	132.2

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.049	Data appear Normal at 5% Significance Level	
Theta Star	12.66		
nu star	72.89		
Approximate Chi Square Value (.05)	54.23	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	63.25
Adjusted Chi Square Value	50.85	95% Jackknife UCL	64.81
		95% Standard Bootstrap UCL	62.81
Anderson-Darling Test Statistic	0.594	95% Bootstrap-t UCL	68.71
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	140.3
Kolmogorov-Smirnov Test Statistic	0.239	95% Percentile Bootstrap UCL	63.06
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	65.58
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	83.03
		97.5% Chebyshev(Mean, Sd) UCL	96.78
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	123.8
95% Approximate Gamma UCL	68.89		
95% Adjusted Gamma UCL	73.47		

Potential UCL to Use		Use 95% Student's-t UCL	64.81

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_55	101-12-147A	22	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.9	Minimum of Log Data	1.065
Maximum	8.3	Maximum of Log Data	2.116
Mean	5.089	Mean of log Data	1.583
Median	5.1	SD of log Data	0.318
SD	1.601		
Coefficient of Variation	0.315		
Skewness	0.692		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.948	Shapiro Wilk Test Statistic	0.967
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6.081	95% H-UCL	6.445
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7.456
95% Adjusted-CLT UCL	6.098	97.5% Chebyshev (MVUE) UCL	8.479
95% Modified-t UCL	6.102	99% Chebyshev (MVUE) UCL	10.49

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	7.744	Data appear Normal at 5% Significance Level	
Theta Star	0.657		
nu star	139.4		
Approximate Chi Square Value (.05)	113.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5.967
Adjusted Chi Square Value	108.1	95% Jackknife UCL	6.081
		95% Standard Bootstrap UCL	5.918
Anderson-Darling Test Statistic	0.231	95% Bootstrap-t UCL	6.253
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	6.564
Kolmogorov-Smirnov Test Statistic	0.14	95% Percentile Bootstrap UCL	5.989
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6.044
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7.415
		97.5% Chebyshev(Mean, Sd) UCL	8.422
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10.4
95% Approximate Gamma UCL	6.271		
95% Adjusted Gamma UCL	6.561		

Potential UCL to Use		Use 95% Student's-t UCL	6.081

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_56	101-12-147A	22	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	141	Minimum of Log Data	4.949
Maximum	930	Maximum of Log Data	6.835
Mean	501.3	Mean of log Data	6.121
Median	495	SD of log Data	0.508
SD	209.6		
Coefficient of Variation	0.418		
Skewness	0.55		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Test Statistic	0.848
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	631.2	95% H-UCL	785.6
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	892.5
95% Adjusted-CLT UCL	629.9	97.5% Chebyshev (MVUE) UCL	1058
95% Modified-t UCL	633.4	99% Chebyshev (MVUE) UCL	1383

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.651	Data appear Normal at 5% Significance Level	
Theta Star	137.3		
nu star	65.71		
Approximate Chi Square Value (.05)	48.06	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	616.2
Adjusted Chi Square Value	44.89	95% Jackknife UCL	631.2
		95% Standard Bootstrap UCL	608.3
Anderson-Darling Test Statistic	0.515	95% Bootstrap-t UCL	648
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	725
Kolmogorov-Smirnov Test Statistic	0.243	95% Percentile Bootstrap UCL	614.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	622
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	805.8
		97.5% Chebyshev(Mean, Sd) UCL	937.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1196
95% Approximate Gamma UCL	685.5		
95% Adjusted Gamma UCL	733.9		

Potential UCL to Use		Use 95% Student's-t UCL	631.2

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_57	101-12-147A	22	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	32	Minimum of Log Data	3.466
Maximum	234	Maximum of Log Data	5.455
Mean	87.83	Mean of log Data	4.309
Median	74.8	SD of log Data	0.588
SD	60.9		
Coefficient of Variation	0.693		
Skewness	2.007		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.792	Shapiro Wilk Test Statistic	0.97
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	125.6	95% H-UCL	147
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	161.7
95% Adjusted-CLT UCL	135.7	97.5% Chebyshev (MVUE) UCL	194.3
95% Modified-t UCL	127.8	99% Chebyshev (MVUE) UCL	258.3

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.176	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	40.37		
nu star	39.16		
Approximate Chi Square Value (.05)	25.83	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	121.2
Adjusted Chi Square Value	23.57	95% Jackknife UCL	125.6
		95% Standard Bootstrap UCL	118.4
Anderson-Darling Test Statistic	0.328	95% Bootstrap-t UCL	164.8
Anderson-Darling 5% Critical Value	0.727	95% Hall's Bootstrap UCL	282.7
Kolmogorov-Smirnov Test Statistic	0.166	95% Percentile Bootstrap UCL	122.2
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	134.8
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	176.3
		97.5% Chebyshev(Mean, Sd) UCL	214.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	289.8
95% Approximate Gamma UCL	133.2		
95% Adjusted Gamma UCL	146		

Potential UCL to Use		Use 95% Approximate Gamma UCL	133.2

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_58	101-12-187	22	Arsenic

General Statistics

Number of Valid Samples	9	Number of Detected Data	7
Number of Unique Samples	7	Number of Non-Detect Data	2
		Percent Non-Detects	22.22%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.78	Minimum Detected	-0.248
Maximum Detected	4.9	Maximum Detected	1.589
Mean of Detected	2.203	Mean of Detected	0.601
SD of Detected	1.491	SD of Detected	0.661
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	1	Maximum Non-Detect	0

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.881	Shapiro Wilk Test Statistic	0.964
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.824	Mean	0.314
SD	1.494	SD	0.809
95% DL/2 (t) UCL	2.75	95% H-Stat (DL/2) UCL	4.683
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	1.285	Mean in Log Scale	0.421
SD	2.046	SD in Log Scale	0.683
95% MLE (t) UCL	2.554	Mean in Original Scale	1.897
95% MLE (Tiku) UCL	2.766	SD in Original Scale	1.429
		95% Percentile Bootstrap UCL	2.669
		95% BCA Bootstrap UCL	2.815

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only
k star (bias corrected)	1.701	Data appear Normal at 5% Significance Level
Theta Star	1.295	
nu star	23.81	
A-D Test Statistic	0.255	
5% A-D Critical Value	0.713	
K-S Test Statistic	0.713	
5% K-S Critical Value	0.314	
Data appear Gamma Distributed at 5% Significance Level		

Assuming Gamma Distribution		Nonparametric Statistics	
Gamma ROS Statistics using Extrapolated Data		Kaplan-Meier (KM) Method	
Minimum	0.726	Mean	1.904
Maximum	4.9	SD	1.34
Mean	1.986	SE of Mean	0.483
Median	1.7	95% KM (t) UCL	2.802
SD	1.384	95% KM (z) UCL	2.698
k star	1.903	95% KM (jackknife) UCL	2.788
Theta star	1.044	95% KM (bootstrap t) UCL	3.694
Nu star	34.25	95% KM (BCA) UCL	2.807
AppChi2	21.86	95% KM (Percentile Bootstrap) UCL	2.744
95% Gamma Approximate UCL	3.111	95% KM (Chebyshev) UCL	4.009
95% Adjusted Gamma UCL	3.435	97.5% KM (Chebyshev) UCL	4.919
		99% KM (Chebyshev) UCL	6.707
		Potential UCLs to Use	
		95% KM (t) UCL	2.802
		95% KM (Percentile Bootstrap) UCL	2.744

Note: DL/2 is not a recommended method.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_59	101-12-187	22	Copper

General Statistics

Number of Valid Samples	9
Number of Unique Samples	9

Raw Statistics

Minimum	111
Maximum	431
Mean	259.1
Median	251
SD	104.5
Coefficient of Variation	0.403
Skewness	0.327

Log-transformed Statistics

Minimum of Log Data	4.71
Maximum of Log Data	6.066
Mean of log Data	5.479
SD of log Data	0.431

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.97
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.971
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	323.9
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	320.5
95% Modified-t UCL	324.5

Assuming Lognormal Distribution

95% H-UCL	367.6
95% Chebyshev (MVUE) UCL	424.9
97.5% Chebyshev (MVUE) UCL	496.2
99% Chebyshev (MVUE) UCL	636.3

Gamma Distribution Test

k star (bias corrected)	4.44
Theta Star	58.36
nu star	79.92
Approximate Chi Square Value (.05)	60.32
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	56.74
Anderson-Darling Test Statistic	0.17
Anderson-Darling 5% Critical Value	0.722
Kolmogorov-Smirnov Test Statistic	0.141
Kolmogorov-Smirnov 5% Critical Value	0.28

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	343.3
95% Adjusted Gamma UCL	364.9

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	316.4
95% Jackknife UCL	323.9
95% Standard Bootstrap UCL	313.8
95% Bootstrap-t UCL	330.8
95% Hall's Bootstrap UCL	323.1
95% Percentile Bootstrap UCL	314.1
95% BCA Bootstrap UCL	318.8
95% Chebyshev(Mean, Sd) UCL	410.9
97.5% Chebyshev(Mean, Sd) UCL	476.6
99% Chebyshev(Mean, Sd) UCL	605.7

Potential UCL to Use	Use 95% Student's-t UCL 323.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_60	101-12-187	22	Lead

General Statistics

Number of Valid Samples	9
Number of Unique Samples	9

Raw Statistics

Minimum	11.3
Maximum	69.8
Mean	38.26
Median	39
SD	22.13
Coefficient of Variation	0.578
Skewness	0.163

Log-transformed Statistics

Minimum of Log Data	2.425
Maximum of Log Data	4.246
Mean of log Data	3.462
SD of log Data	0.676

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.915
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.915
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	51.97
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	50.82
95% Modified-t UCL	52.04

Assuming Lognormal Distribution

95% H-UCL	74.7
95% Chebyshev (MVUE) UCL	77.95
97.5% Chebyshev (MVUE) UCL	94.86
99% Chebyshev (MVUE) UCL	128.1

Gamma Distribution Test

k star (bias corrected)	2.003
Theta Star	19.1
nu star	36.05
Approximate Chi Square Value (.05)	23.31
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	21.18
Anderson-Darling Test Statistic	0.37
Anderson-Darling 5% Critical Value	0.727
Kolmogorov-Smirnov Test Statistic	0.176
Kolmogorov-Smirnov 5% Critical Value	0.281

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	59.16
95% Adjusted Gamma UCL	65.13

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	50.39
95% Jackknife UCL	51.97
95% Standard Bootstrap UCL	49.82
95% Bootstrap-t UCL	53.14
95% Hall's Bootstrap UCL	48.62
95% Percentile Bootstrap UCL	49.89
95% BCA Bootstrap UCL	50.08
95% Chebyshev(Mean, Sd) UCL	70.41
97.5% Chebyshev(Mean, Sd) UCL	84.32
99% Chebyshev(Mean, Sd) UCL	111.7

Potential UCL to Use

Use 95% Student's-t UCL 51.97

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_61	101-12-188B	22	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	0.96	Minimum of Log Data	-0.0408
Maximum	4.8	Maximum of Log Data	1.569
Mean	3.707	Mean of log Data	1.232
Median	3.7	SD of log Data	0.492
SD	1.139		
Coefficient of Variation	0.307		
Skewness	-1.972		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.778	Shapiro Wilk Test Statistic	0.616
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4.413	95% H-UCL	5.765
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.58
95% Adjusted-CLT UCL	4.065	97.5% Chebyshev (MVUE) UCL	7.777
95% Modified-t UCL	4.371	99% Chebyshev (MVUE) UCL	10.13

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.472	Data do not follow a Discernable Distribution (0.05)	
Theta Star	0.829		
nu star	80.5		
Approximate Chi Square Value (.05)	60.82	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4.331
Adjusted Chi Square Value	57.23	95% Jackknife UCL	4.413
		95% Standard Bootstrap UCL	4.3
Anderson-Darling Test Statistic	1.309	95% Bootstrap-t UCL	4.215
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	4.145
Kolmogorov-Smirnov Test Statistic	0.383	95% Percentile Bootstrap UCL	4.233
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	4.122
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5.362
		97.5% Chebyshev(Mean, Sd) UCL	6.079
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	7.486
95% Approximate Gamma UCL	4.906		
95% Adjusted Gamma UCL	5.214		

Potential UCL to Use		Use 95% Student's-t UCL	4.413
		or 95% Modified-t UCL	4.371

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_62	101-12-188B	22	Copper

General Statistics

Number of Valid Samples	9
Number of Unique Samples	9

Raw Statistics

Minimum	165
Maximum	489
Mean	335.1
Median	345
SD	90.12
Coefficient of Variation	0.269
Skewness	-0.432

Log-transformed Statistics

Minimum of Log Data	5.106
Maximum of Log Data	6.192
Mean of log Data	5.776
SD of log Data	0.31

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.905
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.846
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	391
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	379.9
95% Modified-t UCL	390.2

Assuming Lognormal Distribution

95% H-UCL	423
95% Chebyshev (MVUE) UCL	488.9
97.5% Chebyshev (MVUE) UCL	554.8
99% Chebyshev (MVUE) UCL	684.3

Gamma Distribution Test

k star (bias corrected)	8.868
Theta Star	37.79
nu star	159.6
Approximate Chi Square Value (.05)	131.4
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	126
Anderson-Darling Test Statistic	0.712
Anderson-Darling 5% Critical Value	0.722
Kolmogorov-Smirnov Test Statistic	0.322
Kolmogorov-Smirnov 5% Critical Value	0.279

Data follow Appr. Gamma Distribution at 5% Significance Level

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	384.5
95% Jackknife UCL	391
95% Standard Bootstrap UCL	382
95% Bootstrap-t UCL	385
95% Hall's Bootstrap UCL	387.2
95% Percentile Bootstrap UCL	379.4
95% BCA Bootstrap UCL	377.2
95% Chebyshev(Mean, Sd) UCL	466
97.5% Chebyshev(Mean, Sd) UCL	522.7
99% Chebyshev(Mean, Sd) UCL	634

Assuming Gamma Distribution

95% Approximate Gamma UCL	407
95% Adjusted Gamma UCL	424.5

Potential UCL to Use

Use 95% Student's-t UCL 391

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_63	101-12-188B	22	Lead

General Statistics

Number of Valid Samples	9
Number of Unique Samples	9

Raw Statistics

Minimum	20.2
Maximum	53
Mean	35.28
Median	30.8
SD	11.34
Coefficient of Variation	0.321
Skewness	0.352

Log-transformed Statistics

Minimum of Log Data	3.006
Maximum of Log Data	3.97
Mean of log Data	3.516
SD of log Data	0.326

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.936
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.952
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	42.31
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	41.97
95% Modified-t UCL	42.38

Assuming Lognormal Distribution

95% H-UCL	45.03
95% Chebyshev (MVUE) UCL	52.14
97.5% Chebyshev (MVUE) UCL	59.43
99% Chebyshev (MVUE) UCL	73.75

Gamma Distribution Test

k star (bias corrected)	7.311
Theta Star	4.825
nu star	131.6
Approximate Chi Square Value (.05)	106.1
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	101.3
Anderson-Darling Test Statistic	0.301
Anderson-Darling 5% Critical Value	0.722
Kolmogorov-Smirnov Test Statistic	0.187
Kolmogorov-Smirnov 5% Critical Value	0.279

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	43.76
95% Adjusted Gamma UCL	45.84

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	41.49
95% Jackknife UCL	42.31
95% Standard Bootstrap UCL	41.11
95% Bootstrap-t UCL	43.13
95% Hall's Bootstrap UCL	41.09
95% Percentile Bootstrap UCL	41.11
95% BCA Bootstrap UCL	41.38
95% Chebyshev(Mean, Sd) UCL	51.75
97.5% Chebyshev(Mean, Sd) UCL	58.88
99% Chebyshev(Mean, Sd) UCL	72.88

Potential UCL to Use	Use 95% Student's-t UCL 42.31

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_64	101-12-193	23	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	4.1	Minimum of Log Data	1.411
Maximum	7	Maximum of Log Data	1.946
Mean	5.433	Mean of log Data	1.68
Median	5.4	SD of log Data	0.169
SD	0.927		
Coefficient of Variation	0.171		
Skewness	0.457		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.962	Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6.008	95% H-UCL	6.093
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.772
95% Adjusted-CLT UCL	5.992	97.5% Chebyshev (MVUE) UCL	7.351
95% Modified-t UCL	6.016	99% Chebyshev (MVUE) UCL	8.489

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	26.27	Data appear Normal at 5% Significance Level	
Theta Star	0.207		
nu star	472.8		
Approximate Chi Square Value (.05)	423.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5.942
Adjusted Chi Square Value	413.5	95% Jackknife UCL	6.008
		95% Standard Bootstrap UCL	5.908
Anderson-Darling Test Statistic	0.201	95% Bootstrap-t UCL	6.125
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	6.291
Kolmogorov-Smirnov Test Statistic	0.161	95% Percentile Bootstrap UCL	5.922
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	5.978
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.781
		97.5% Chebyshev(Mean, Sd) UCL	7.364
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	8.509
95% Approximate Gamma UCL	6.068		
95% Adjusted Gamma UCL	6.213		

Potential UCL to Use		Use 95% Student's-t UCL	6.008

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_65	101-12-193	23	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	176	Minimum of Log Data	5.17
Maximum	1070	Maximum of Log Data	6.975
Mean	483.8	Mean of log Data	6.03
Median	389	SD of log Data	0.584
SD	289.3		
Coefficient of Variation	0.598		
Skewness	1.15		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.904	Shapiro Wilk Test Statistic	0.985
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	663.1	95% H-UCL	815.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	899.6
95% Adjusted-CLT UCL	681.9	97.5% Chebyshev (MVUE) UCL	1080
95% Modified-t UCL	669.3	99% Chebyshev (MVUE) UCL	1434

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.382	Data appear Normal at 5% Significance Level	
Theta Star	203.1		
nu star	42.87		
Approximate Chi Square Value (.05)	28.86	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	642.4
Adjusted Chi Square Value	26.46	95% Jackknife UCL	663.1
		95% Standard Bootstrap UCL	631.7
Anderson-Darling Test Statistic	0.177	95% Bootstrap-t UCL	758
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	1006
Kolmogorov-Smirnov Test Statistic	0.138	95% Percentile Bootstrap UCL	639.7
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	666.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	904.1
		97.5% Chebyshev(Mean, Sd) UCL	1086
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1443
95% Approximate Gamma UCL	718.7		
95% Adjusted Gamma UCL	783.9		

Potential UCL to Use		Use 95% Student's-t UCL	663.1

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_66	101-12-193	23	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	54.9	Minimum of Log Data	4.006
Maximum	3330	Maximum of Log Data	8.111
Mean	699.1	Mean of log Data	5.766
Median	428	SD of log Data	1.347
SD	1032		
Coefficient of Variation	1.476		
Skewness	2.539		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.649	Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	1339	95% H-UCL	5692
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2050
95% Adjusted-CLT UCL	1576	97.5% Chebyshev (MVUE) UCL	2644
95% Modified-t UCL	1387	99% Chebyshev (MVUE) UCL	3812

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.582	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1202		
nu star	10.47		
Approximate Chi Square Value (.05)	4.24	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	1265
Adjusted Chi Square Value	3.444	95% Jackknife UCL	1339
		95% Standard Bootstrap UCL	1220
Anderson-Darling Test Statistic	0.387	95% Bootstrap-t UCL	2583
Anderson-Darling 5% Critical Value	0.751	95% Hall's Bootstrap UCL	3617
Kolmogorov-Smirnov Test Statistic	0.162	95% Percentile Bootstrap UCL	1312
Kolmogorov-Smirnov 5% Critical Value	0.289	95% BCA Bootstrap UCL	1597
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2198
		97.5% Chebyshev(Mean, Sd) UCL	2847
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	4121
95% Approximate Gamma UCL	1727		
95% Adjusted Gamma UCL	2126		

Potential UCL to Use		Use 95% Approximate Gamma UCL	1727

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_67	101-12-234	23	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	2.9	Minimum of Log Data	1.065
Maximum	9.1	Maximum of Log Data	2.208
Mean	5.056	Mean of log Data	1.54
Median	4.5	SD of log Data	0.411
SD	2.316		
Coefficient of Variation	0.458		
Skewness	1.246		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.797	Shapiro Wilk Test Statistic	0.885
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6.491	95% H-UCL	6.951
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8.052
95% Adjusted-CLT UCL	6.668	97.5% Chebyshev (MVUE) UCL	9.361
95% Modified-t UCL	6.544	99% Chebyshev (MVUE) UCL	11.93

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.322	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.17		
nu star	77.8		
Approximate Chi Square Value (.05)	58.48	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6.325
Adjusted Chi Square Value	54.96	95% Jackknife UCL	6.491
		95% Standard Bootstrap UCL	6.259
Anderson-Darling Test Statistic	0.618	95% Bootstrap-t UCL	8.645
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	15.62
Kolmogorov-Smirnov Test Statistic	0.236	95% Percentile Bootstrap UCL	6.3
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	6.456
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8.42
		97.5% Chebyshev(Mean, Sd) UCL	9.876
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	12.74
95% Approximate Gamma UCL	6.726		
95% Adjusted Gamma UCL	7.156		

Potential UCL to Use		Use 95% Approximate Gamma UCL	6.726

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_68	101-12-234	23	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	94	Minimum of Log Data	4.543
Maximum	324	Maximum of Log Data	5.781
Mean	226.4	Mean of log Data	5.351
Median	243	SD of log Data	0.426
SD	80.37		
Coefficient of Variation	0.355		
Skewness	-0.547		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.933	Shapiro Wilk Test Statistic	0.879
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	276.3	95% H-UCL	321.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	371.5
95% Adjusted-CLT UCL	265.3	97.5% Chebyshev (MVUE) UCL	433.3
95% Modified-t UCL	275.4	99% Chebyshev (MVUE) UCL	554.8

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.875	Data appear Normal at 5% Significance Level	
Theta Star	46.45		
nu star	87.75		
Approximate Chi Square Value (.05)	67.16	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	270.5
Adjusted Chi Square Value	63.37	95% Jackknife UCL	276.3
		95% Standard Bootstrap UCL	268
Anderson-Darling Test Statistic	0.436	95% Bootstrap-t UCL	271.1
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	265.9
Kolmogorov-Smirnov Test Statistic	0.179	95% Percentile Bootstrap UCL	264.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	262.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	343.2
		97.5% Chebyshev(Mean, Sd) UCL	393.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	493
95% Approximate Gamma UCL	295.9		
95% Adjusted Gamma UCL	313.6		

Potential UCL to Use		Use 95% Student's-t UCL	276.3

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_69	101-12-234	23	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	25.1	Minimum of Log Data	3.223
Maximum	430	Maximum of Log Data	6.064
Mean	136.9	Mean of log Data	4.505
Median	88.7	SD of log Data	0.969
SD	135.6		
Coefficient of Variation	0.99		
Skewness	1.537		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.815	Shapiro Wilk Test Statistic	0.959
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	220.9	95% H-UCL	437.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	332
95% Adjusted-CLT UCL	236	97.5% Chebyshev (MVUE) UCL	417.1
95% Modified-t UCL	224.8	99% Chebyshev (MVUE) UCL	584.4

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.974	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	140.6		
nu star	17.53		
Approximate Chi Square Value (.05)	9.049	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	211.2
Adjusted Chi Square Value	7.799	95% Jackknife UCL	220.9
		95% Standard Bootstrap UCL	205.6
Anderson-Darling Test Statistic	0.311	95% Bootstrap-t UCL	310
Anderson-Darling 5% Critical Value	0.737	95% Hall's Bootstrap UCL	558.6
Kolmogorov-Smirnov Test Statistic	0.159	95% Percentile Bootstrap UCL	207.5
Kolmogorov-Smirnov 5% Critical Value	0.285	95% BCA Bootstrap UCL	229.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	333.9
		97.5% Chebyshev(Mean, Sd) UCL	419.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	586.5
95% Approximate Gamma UCL	265.1		
95% Adjusted Gamma UCL	307.7		

Potential UCL to Use		Use 95% Approximate Gamma UCL	265.1

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_70	101-12-236	23	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	1.2	Minimum of Log Data	0.182
Maximum	7.3	Maximum of Log Data	1.988
Mean	4.322	Mean of log Data	1.366
Median	3.8	SD of log Data	0.517
SD	1.751		
Coefficient of Variation	0.405		
Skewness	-0.0644		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.859
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	5.407	95% H-UCL	6.861
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7.773
95% Adjusted-CLT UCL	5.269	97.5% Chebyshev (MVUE) UCL	9.228
95% Modified-t UCL	5.405	99% Chebyshev (MVUE) UCL	12.09

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.596	Data appear Normal at 5% Significance Level	
Theta Star	1.202		
nu star	64.73		
Approximate Chi Square Value (.05)	47.22	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	5.282
Adjusted Chi Square Value	44.08	95% Jackknife UCL	5.407
		95% Standard Bootstrap UCL	5.227
Anderson-Darling Test Statistic	0.411	95% Bootstrap-t UCL	5.356
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	5.404
Kolmogorov-Smirnov Test Statistic	0.217	95% Percentile Bootstrap UCL	5.244
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	5.211
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	6.866
		97.5% Chebyshev(Mean, Sd) UCL	7.966
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	10.13
95% Approximate Gamma UCL	5.925		
95% Adjusted Gamma UCL	6.347		

Potential UCL to Use		Use 95% Student's-t UCL	5.407

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_71	101-12-236	23	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	81.3	Minimum of Log Data	4.398
Maximum	1050	Maximum of Log Data	6.957
Mean	453.7	Mean of log Data	5.878
Median	360	SD of log Data	0.79
SD	305.5		
Coefficient of Variation	0.673		
Skewness	0.838		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.944	Shapiro Wilk Test Statistic	0.968
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	643.1	95% H-UCL	1079
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1021
95% Adjusted-CLT UCL	651.6	97.5% Chebyshev (MVUE) UCL	1260
95% Modified-t UCL	647.8	99% Chebyshev (MVUE) UCL	1730

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.567	Data appear Normal at 5% Significance Level	
Theta Star	289.4		
nu star	28.21		
Approximate Chi Square Value (.05)	17.1	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	621.2
Adjusted Chi Square Value	15.3	95% Jackknife UCL	643.1
		95% Standard Bootstrap UCL	614.4
Anderson-Darling Test Statistic	0.143	95% Bootstrap-t UCL	700
Anderson-Darling 5% Critical Value	0.729	95% Hall's Bootstrap UCL	699.2
Kolmogorov-Smirnov Test Statistic	0.123	95% Percentile Bootstrap UCL	621.1
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	631.9
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	897.6
		97.5% Chebyshev(Mean, Sd) UCL	1090
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1467
95% Approximate Gamma UCL	748.8		
95% Adjusted Gamma UCL	836.8		

Potential UCL to Use		Use 95% Student's-t UCL	643.1

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_72	101-12-236	23	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	9.4	Minimum of Log Data	2.241
Maximum	176	Maximum of Log Data	5.17
Mean	82.24	Mean of log Data	4.016
Median	70.1	SD of log Data	1.051
SD	63.9		
Coefficient of Variation	0.777		
Skewness	0.374		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Test Statistic	0.921
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	121.9	95% H-UCL	344.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	229.4
95% Adjusted-CLT UCL	120.1	97.5% Chebyshev (MVUE) UCL	290.2
95% Modified-t UCL	122.3	99% Chebyshev (MVUE) UCL	409.8

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.017	Data appear Normal at 5% Significance Level	
Theta Star	80.83		
nu star	18.31		
Approximate Chi Square Value (.05)	9.618	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	117.3
Adjusted Chi Square Value	8.323	95% Jackknife UCL	121.9
		95% Standard Bootstrap UCL	114.6
Anderson-Darling Test Statistic	0.299	95% Bootstrap-t UCL	126.1
Anderson-Darling 5% Critical Value	0.736	95% Hall's Bootstrap UCL	113.8
Kolmogorov-Smirnov Test Statistic	0.173	95% Percentile Bootstrap UCL	115.6
Kolmogorov-Smirnov 5% Critical Value	0.284	95% BCA Bootstrap UCL	117.2
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	175.1
		97.5% Chebyshev(Mean, Sd) UCL	215.3
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	294.2
95% Approximate Gamma UCL	156.6		
95% Adjusted Gamma UCL	181		

Potential UCL to Use		Use 95% Student's-t UCL	121.9

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_73	101-10-019	24	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	7

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.1	Minimum of Log Data	1.131
Maximum	4.7	Maximum of Log Data	1.548
Mean	4.144	Mean of log Data	1.415
Median	4.1	SD of log Data	0.13
SD	0.505		
Coefficient of Variation	0.122		
Skewness	-1.046		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Test Statistic	0.874
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	4.458	95% H-UCL	4.519
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	4.931
95% Adjusted-CLT UCL	4.359	97.5% Chebyshev (MVUE) UCL	5.27
95% Modified-t UCL	4.448	99% Chebyshev (MVUE) UCL	5.938

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	46.49	Data appear Normal at 5% Significance Level	
Theta Star	0.0892		
nu star	836.8		
Approximate Chi Square Value (.05)	770.6	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4.421
Adjusted Chi Square Value	757.2	95% Jackknife UCL	4.458
		95% Standard Bootstrap UCL	4.4
Anderson-Darling Test Statistic	0.458	95% Bootstrap-t UCL	4.4
Anderson-Darling 5% Critical Value	0.72	95% Hall's Bootstrap UCL	4.365
Kolmogorov-Smirnov Test Statistic	0.214	95% Percentile Bootstrap UCL	4.389
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	4.367
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	4.879
		97.5% Chebyshev(Mean, Sd) UCL	5.196
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	5.82
95% Approximate Gamma UCL	4.5		
95% Adjusted Gamma UCL	4.58		

Potential UCL to Use		Use 95% Student's-t UCL	4.458

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_74	101-10-019	24	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	326	Minimum of Log Data	5.787
Maximum	490	Maximum of Log Data	6.194
Mean	384.4	Mean of log Data	5.944
Median	377	SD of log Data	0.13
SD	52.38		
Coefficient of Variation	0.136		
Skewness	1.147		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.9	Shapiro Wilk Test Statistic	0.928
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	416.9	95% H-UCL	419
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	457.1
95% Adjusted-CLT UCL	420.3	97.5% Chebyshev (MVUE) UCL	488.6
95% Modified-t UCL	418	99% Chebyshev (MVUE) UCL	550.4

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	43.19	Data appear Normal at 5% Significance Level	
Theta Star	8.9		
nu star	777.5		
Approximate Chi Square Value (.05)	713.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	413.2
Adjusted Chi Square Value	700.9	95% Jackknife UCL	416.9
		95% Standard Bootstrap UCL	411.6
Anderson-Darling Test Statistic	0.377	95% Bootstrap-t UCL	439.3
Anderson-Darling 5% Critical Value	0.72	95% Hall's Bootstrap UCL	596.8
Kolmogorov-Smirnov Test Statistic	0.207	95% Percentile Bootstrap UCL	412.7
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	417.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	460.5
		97.5% Chebyshev(Mean, Sd) UCL	493.5
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	558.2
95% Approximate Gamma UCL	418.8		
95% Adjusted Gamma UCL	426.5		

Potential UCL to Use		Use 95% Student's-t UCL	416.9

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_75	101-10-019	24	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	15.4	Minimum of Log Data	2.734
Maximum	37.2	Maximum of Log Data	3.616
Mean	24.31	Mean of log Data	3.156
Median	23.7	SD of log Data	0.278
SD	6.866		
Coefficient of Variation	0.282		
Skewness	0.661		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.958	Shapiro Wilk Test Statistic	0.982
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	28.57	95% H-UCL	29.72
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	34.18
95% Adjusted-CLT UCL	28.61	97.5% Chebyshev (MVUE) UCL	38.45
95% Modified-t UCL	28.65	99% Chebyshev (MVUE) UCL	46.84

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	9.816	Data appear Normal at 5% Significance Level	
Theta Star	2.477		
nu star	176.7		
Approximate Chi Square Value (.05)	147	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	28.08
Adjusted Chi Square Value	141.2	95% Jackknife UCL	28.57
		95% Standard Bootstrap UCL	27.87
Anderson-Darling Test Statistic	0.18	95% Bootstrap-t UCL	29.59
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	29.23
Kolmogorov-Smirnov Test Statistic	0.152	95% Percentile Bootstrap UCL	28.04
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	28.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	34.29
		97.5% Chebyshev(Mean, Sd) UCL	38.6
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	47.08
95% Approximate Gamma UCL	29.23		
95% Adjusted Gamma UCL	30.42		

Potential UCL to Use		Use 95% Student's-t UCL	28.57

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_76	101-10-023	24	Arsenic

General Statistics

Number of Valid Samples	9
Number of Unique Samples	8

Raw Statistics

Minimum	3.8
Maximum	6.9
Mean	5.411
Median	5.4
SD	1.04
Coefficient of Variation	0.192
Skewness	-0.066

Log-transformed Statistics

Minimum of Log Data	1.335
Maximum of Log Data	1.932
Mean of log Data	1.671
SD of log Data	0.199

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.925
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.917
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	6.056
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	5.973
95% Modified-t UCL	6.054

Assuming Lognormal Distribution

95% H-UCL	6.209
95% Chebyshev (MVUE) UCL	6.983
97.5% Chebyshev (MVUE) UCL	7.663
99% Chebyshev (MVUE) UCL	8.997

Gamma Distribution Test

k star (bias corrected)	19.61
Theta Star	0.276
nu star	353.1
Approximate Chi Square Value (.05)	310.5
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	302.1
Anderson-Darling Test Statistic	0.404
Anderson-Darling 5% Critical Value	0.721
Kolmogorov-Smirnov Test Statistic	0.187
Kolmogorov-Smirnov 5% Critical Value	0.279

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	6.152
95% Adjusted Gamma UCL	6.324

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	5.981
95% Jackknife UCL	6.056
95% Standard Bootstrap UCL	5.957
95% Bootstrap-t UCL	6.063
95% Hall's Bootstrap UCL	6.147
95% Percentile Bootstrap UCL	5.911
95% BCA Bootstrap UCL	5.911
95% Chebyshev(Mean, Sd) UCL	6.922
97.5% Chebyshev(Mean, Sd) UCL	7.576
99% Chebyshev(Mean, Sd) UCL	8.86

Potential UCL to Use

Use 95% Student's-t UCL 6.056

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_77	101-10-023	24	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	313	Minimum of Log Data	5.746
Maximum	657	Maximum of Log Data	6.488
Mean	463.4	Mean of log Data	6.11
Median	445	SD of log Data	0.253
SD	116.5		
Coefficient of Variation	0.251		
Skewness	0.365		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.956	Shapiro Wilk Test Statistic	0.96
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	535.7	95% H-UCL	555.1
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	634.8
95% Adjusted-CLT UCL	532.4	97.5% Chebyshev (MVUE) UCL	708.9
95% Modified-t UCL	536.5	99% Chebyshev (MVUE) UCL	854.5

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	11.97	Data appear Normal at 5% Significance Level	
Theta Star	38.73		
nu star	215.4		
Approximate Chi Square Value (.05)	182.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	527.3
Adjusted Chi Square Value	176	95% Jackknife UCL	535.7
		95% Standard Bootstrap UCL	522
Anderson-Darling Test Statistic	0.204	95% Bootstrap-t UCL	544.6
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	544.2
Kolmogorov-Smirnov Test Statistic	0.133	95% Percentile Bootstrap UCL	526
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	528.4
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	632.7
		97.5% Chebyshev(Mean, Sd) UCL	706
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	849.9
95% Approximate Gamma UCL	547.2		
95% Adjusted Gamma UCL	567.1		

Potential UCL to Use		Use 95% Student's-t UCL	535.7

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_78	101-10-023	24	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	27.8	Minimum of Log Data	3.325
Maximum	67.9	Maximum of Log Data	4.218
Mean	43.73	Mean of log Data	3.745
Median	41.5	SD of log Data	0.274
SD	12.14		
Coefficient of Variation	0.278		
Skewness	0.745		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.955	Shapiro Wilk Test Statistic	0.978
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	51.26	95% H-UCL	53.29
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	61.23
95% Adjusted-CLT UCL	51.46	97.5% Chebyshev (MVUE) UCL	68.8
95% Modified-t UCL	51.42	99% Chebyshev (MVUE) UCL	83.68

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	10.15	Data appear Normal at 5% Significance Level	
Theta Star	4.309		
nu star	182.7		
Approximate Chi Square Value (.05)	152.4	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	50.39
Adjusted Chi Square Value	146.6	95% Jackknife UCL	51.26
		95% Standard Bootstrap UCL	49.96
Anderson-Darling Test Statistic	0.178	95% Bootstrap-t UCL	52.75
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	54.09
Kolmogorov-Smirnov Test Statistic	0.118	95% Percentile Bootstrap UCL	50.18
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	50.82
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	61.37
		97.5% Chebyshev(Mean, Sd) UCL	69
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	83.99
95% Approximate Gamma UCL	52.42		
95% Adjusted Gamma UCL	54.5		

Potential UCL to Use		Use 95% Student's-t UCL	51.26

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_79	101-12-241	24	Arsenic

General Statistics

Number of Valid Samples	9
Number of Unique Samples	7

Raw Statistics

Minimum	2.9
Maximum	6.3
Mean	4.2
Median	4.2
SD	1.022
Coefficient of Variation	0.243
Skewness	1.034

Log-transformed Statistics

Minimum of Log Data	1.065
Maximum of Log Data	1.841
Mean of log Data	1.41
SD of log Data	0.232

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.93
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.972
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	4.834
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	4.886
95% Modified-t UCL	4.853

Assuming Lognormal Distribution

95% H-UCL	4.94
95% Chebyshev (MVUE) UCL	5.617
97.5% Chebyshev (MVUE) UCL	6.231
99% Chebyshev (MVUE) UCL	7.438

Gamma Distribution Test

k star (bias corrected)	13.74
Theta Star	0.306
nu star	247.3
Approximate Chi Square Value (.05)	211.8
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	204.9
Anderson-Darling Test Statistic	0.25
Anderson-Darling 5% Critical Value	0.721
Kolmogorov-Smirnov Test Statistic	0.172
Kolmogorov-Smirnov 5% Critical Value	0.279

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	4.76
95% Jackknife UCL	4.834
95% Standard Bootstrap UCL	4.732
95% Bootstrap-t UCL	5.101
95% Hall's Bootstrap UCL	5.846
95% Percentile Bootstrap UCL	4.789
95% BCA Bootstrap UCL	4.833
95% Chebyshev(Mean, Sd) UCL	5.685
97.5% Chebyshev(Mean, Sd) UCL	6.328
99% Chebyshev(Mean, Sd) UCL	7.59

Assuming Gamma Distribution

95% Approximate Gamma UCL	4.902
95% Adjusted Gamma UCL	5.068

Potential UCL to Use

Use 95% Student's-t UCL 4.834

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_80	101-12-241	24	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	144	Minimum of Log Data	4.97
Maximum	491	Maximum of Log Data	6.196
Mean	295.2	Mean of log Data	5.605
Median	273	SD of log Data	0.435
SD	126.7		
Coefficient of Variation	0.429		
Skewness	0.571		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.917	Shapiro Wilk Test Statistic	0.953
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	373.8	95% H-UCL	419
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	484
95% Adjusted-CLT UCL	373.3	97.5% Chebyshev (MVUE) UCL	565.7
95% Modified-t UCL	375.1	99% Chebyshev (MVUE) UCL	726.1

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	4.201	Data appear Normal at 5% Significance Level	
Theta Star	70.28		
nu star	75.61		
Approximate Chi Square Value (.05)	56.58	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	364.7
Adjusted Chi Square Value	53.13	95% Jackknife UCL	373.8
		95% Standard Bootstrap UCL	359.9
Anderson-Darling Test Statistic	0.244	95% Bootstrap-t UCL	396.3
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	392.6
Kolmogorov-Smirnov Test Statistic	0.148	95% Percentile Bootstrap UCL	364
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	362.1
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	479.3
		97.5% Chebyshev(Mean, Sd) UCL	559
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	715.5
95% Approximate Gamma UCL	394.5		
95% Adjusted Gamma UCL	420.2		

Potential UCL to Use		Use 95% Student's-t UCL	373.8

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_81	101-12-241	24	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	18.1	Minimum of Log Data	2.896
Maximum	126	Maximum of Log Data	4.836
Mean	37.54	Mean of log Data	3.411
Median	25.4	SD of log Data	0.607
SD	34.17		
Coefficient of Variation	0.91		
Skewness	2.689		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.598	Shapiro Wilk Test Statistic	0.8
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	58.73	95% H-UCL	62.03
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	67.6
95% Adjusted-CLT UCL	67.19	97.5% Chebyshev (MVUE) UCL	81.44
95% Modified-t UCL	60.43	99% Chebyshev (MVUE) UCL	108.6

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.734	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	21.65		
nu star	31.21		
Approximate Chi Square Value (.05)	19.45	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	56.28
Adjusted Chi Square Value	17.52	95% Jackknife UCL	58.73
		95% Standard Bootstrap UCL	56.13
Anderson-Darling Test Statistic	1.029	95% Bootstrap-t UCL	127.9
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	134.7
Kolmogorov-Smirnov Test Statistic	0.268	95% Percentile Bootstrap UCL	58
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	68.99
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	87.19
		97.5% Chebyshev(Mean, Sd) UCL	108.7
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	150.9
95% Approximate Gamma UCL	60.25		
95% Adjusted Gamma UCL	66.9		

Potential UCL to Use		Use 95% Approximate Gamma UCL	60.25

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_82	101-12-154A	25	Arsenic

General Statistics

Number of Valid Samples	9
Number of Unique Samples	8

Raw Statistics

Minimum	2.7
Maximum	6.3
Mean	3.889
Median	3.6
SD	1.277
Coefficient of Variation	0.328
Skewness	1.125

Log-transformed Statistics

Minimum of Log Data	0.993
Maximum of Log Data	1.841
Mean of log Data	1.315
SD of log Data	0.303

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.85
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.896
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	4.681
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	4.76
95% Modified-t UCL	4.707

Assuming Lognormal Distribution

95% H-UCL	4.848
95% Chebyshev (MVUE) UCL	5.598
97.5% Chebyshev (MVUE) UCL	6.342
99% Chebyshev (MVUE) UCL	7.803

Gamma Distribution Test

k star (bias corrected)	7.93
Theta Star	0.49
nu star	142.7
Approximate Chi Square Value (.05)	116.1
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	111.1
Anderson-Darling Test Statistic	0.5
Anderson-Darling 5% Critical Value	0.722
Kolmogorov-Smirnov Test Statistic	0.201
Kolmogorov-Smirnov 5% Critical Value	0.279

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	4.589
95% Jackknife UCL	4.681
95% Standard Bootstrap UCL	4.557
95% Bootstrap-t UCL	5.369
95% Hall's Bootstrap UCL	7.784
95% Percentile Bootstrap UCL	4.556
95% BCA Bootstrap UCL	4.644
95% Chebyshev(Mean, Sd) UCL	5.745
97.5% Chebyshev(Mean, Sd) UCL	6.547
99% Chebyshev(Mean, Sd) UCL	8.125

Assuming Gamma Distribution

95% Approximate Gamma UCL	4.78
95% Adjusted Gamma UCL	4.998

Potential UCL to Use

Use 95% Student's-t UCL 4.681

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_83	101-12-154A	25	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics

Minimum	293
Maximum	1070
Mean	563.9
Median	484
SD	290
Coefficient of Variation	0.514
Skewness	1.213

Log-transformed Statistics

Minimum of Log Data	5.68
Maximum of Log Data	6.975
Mean of log Data	6.232
SD of log Data	0.467

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.796
Shapiro Wilk Critical Value	0.829

Data not Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.886
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	743.7
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	764.7
95% Modified-t UCL	750.2

Assuming Lognormal Distribution

95% H-UCL	822.5
95% Chebyshev (MVUE) UCL	944.7
97.5% Chebyshev (MVUE) UCL	1111
99% Chebyshev (MVUE) UCL	1438

Gamma Distribution Test

k star (bias corrected)	3.417
Theta Star	165
nu star	61.51
Approximate Chi Square Value (.05)	44.47
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	41.43
Anderson-Darling Test Statistic	0.617
Anderson-Darling 5% Critical Value	0.723
Kolmogorov-Smirnov Test Statistic	0.234
Kolmogorov-Smirnov 5% Critical Value	0.28

Data appear Gamma Distributed at 5% Significance Level

Data Distribution

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	722.9
95% Jackknife UCL	743.7
95% Standard Bootstrap UCL	714.9
95% Bootstrap-t UCL	1005
95% Hall's Bootstrap UCL	1958
95% Percentile Bootstrap UCL	721.8
95% BCA Bootstrap UCL	765.6
95% Chebyshev(Mean, Sd) UCL	985.3
97.5% Chebyshev(Mean, Sd) UCL	1168
99% Chebyshev(Mean, Sd) UCL	1526

Assuming Gamma Distribution

95% Approximate Gamma UCL	779.9
95% Adjusted Gamma UCL	837.1

Potential UCL to Use

Use 95% Approximate Gamma UCL 779.9

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_84	101-12-154A	25	Lead

General Statistics

Number of Valid Samples	9
Number of Unique Samples	9

Raw Statistics

Minimum	53.7
Maximum	167
Mean	93.99
Median	90.7
SD	32.66
Coefficient of Variation	0.348
Skewness	1.347

Log-transformed Statistics

Minimum of Log Data	3.983
Maximum of Log Data	5.118
Mean of log Data	4.494
SD of log Data	0.327

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.889
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.963
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	114.2
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	117.1
95% Modified-t UCL	115

Assuming Lognormal Distribution

95% H-UCL	119.8
95% Chebyshev (MVUE) UCL	138.8
97.5% Chebyshev (MVUE) UCL	158.2
99% Chebyshev (MVUE) UCL	196.4

Gamma Distribution Test

k star (bias corrected)	7.006
Theta Star	13.41
nu star	126.1
Approximate Chi Square Value (.05)	101.2
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	96.47
Anderson-Darling Test Statistic	0.286
Anderson-Darling 5% Critical Value	0.722
Kolmogorov-Smirnov Test Statistic	0.187
Kolmogorov-Smirnov 5% Critical Value	0.279

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	117.2
95% Adjusted Gamma UCL	122.9

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	111.9
95% Jackknife UCL	114.2
95% Standard Bootstrap UCL	111.2
95% Bootstrap-t UCL	122.2
95% Hall's Bootstrap UCL	206.9
95% Percentile Bootstrap UCL	111.3
95% BCA Bootstrap UCL	117.4
95% Chebyshev(Mean, Sd) UCL	141.4
97.5% Chebyshev(Mean, Sd) UCL	162
99% Chebyshev(Mean, Sd) UCL	202.3

Potential UCL to Use

Use 95% Student's-t UCL 114.2

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_85	101-12-155	25	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		Log-transformed Statistics	
Minimum	0.63	Minimum of Log Data	-0.462
Maximum	7.1	Maximum of Log Data	1.96
Mean	2.992	Mean of log Data	0.882
Median	2.4	SD of log Data	0.731
SD	1.987		
Coefficient of Variation	0.664		
Skewness	1.044		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.918	Shapiro Wilk Test Statistic	0.974
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	4.224	95% H-UCL	6.371
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	6.367
95% Adjusted-CLT UCL	4.328	97.5% Chebyshev (MVUE) UCL	7.804
95% Modified-t UCL	4.262	99% Chebyshev (MVUE) UCL	10.63

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.732	Data appear Normal at 5% Significance Level	
Theta Star	1.727		
nu star	31.18		
Approximate Chi Square Value (.05)	19.42	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	4.082
Adjusted Chi Square Value	17.49	95% Jackknife UCL	4.224
		95% Standard Bootstrap UCL	4.031
Anderson-Darling Test Statistic	0.182	95% Bootstrap-t UCL	4.615
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	4.636
Kolmogorov-Smirnov Test Statistic	0.14	95% Percentile Bootstrap UCL	4.081
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	4.289
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	5.879
		97.5% Chebyshev(Mean, Sd) UCL	7.129
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9.582
95% Approximate Gamma UCL	4.804		
95% Adjusted Gamma UCL	5.334		

Potential UCL to Use		Use 95% Student's-t UCL	4.224

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_86	101-12-155	25	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	196	Minimum of Log Data	5.278
Maximum	908	Maximum of Log Data	6.811
Mean	564.1	Mean of log Data	6.193
Median	591	SD of log Data	0.596
SD	287.8		
Coefficient of Variation	0.51		
Skewness	-0.0702		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.876	Shapiro Wilk Test Statistic	0.872
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	742.5	95% H-UCL	982
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1076
95% Adjusted-CLT UCL	719.5	97.5% Chebyshev (MVUE) UCL	1294
95% Modified-t UCL	742.1	99% Chebyshev (MVUE) UCL	1723

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.515	Data appear Normal at 5% Significance Level	
Theta Star	224.3		
nu star	45.28		
Approximate Chi Square Value (.05)	30.84	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	721.9
Adjusted Chi Square Value	28.35	95% Jackknife UCL	742.5
		95% Standard Bootstrap UCL	715.8
Anderson-Darling Test Statistic	0.55	95% Bootstrap-t UCL	748.7
Anderson-Darling 5% Critical Value	0.726	95% Hall's Bootstrap UCL	690.2
Kolmogorov-Smirnov Test Statistic	0.235	95% Percentile Bootstrap UCL	712.2
Kolmogorov-Smirnov 5% Critical Value	0.281	95% BCA Bootstrap UCL	705
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	982.3
		97.5% Chebyshev(Mean, Sd) UCL	1163
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1519
95% Approximate Gamma UCL	828.1		
95% Adjusted Gamma UCL	900.9		

Potential UCL to Use		Use 95% Student's-t UCL	742.5

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_87	101-12-155	25	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	35.5	Minimum of Log Data	3.57
Maximum	1510	Maximum of Log Data	7.32
Mean	226	Mean of log Data	4.485
Median	71.4	SD of log Data	1.112
SD	481.9		
Coefficient of Variation	2.133		
Skewness	2.991		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.428	Shapiro Wilk Test Statistic	0.671
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	524.7	95% H-UCL	669.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	400.8
95% Adjusted-CLT UCL	661.3	97.5% Chebyshev (MVUE) UCL	509.4
95% Modified-t UCL	551.4	99% Chebyshev (MVUE) UCL	722.8

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	0.509	Data do not follow a Discernable Distribution (0.05)	
Theta Star	443.7		
nu star	9.167		
Approximate Chi Square Value (.05)	3.428	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	490.2
Adjusted Chi Square Value	2.73	95% Jackknife UCL	524.7
		95% Standard Bootstrap UCL	482.1
Anderson-Darling Test Statistic	1.986	95% Bootstrap-t UCL	5298
Anderson-Darling 5% Critical Value	0.759	95% Hall's Bootstrap UCL	3483
Kolmogorov-Smirnov Test Statistic	0.456	95% Percentile Bootstrap UCL	546.8
Kolmogorov-Smirnov 5% Critical Value	0.291	95% BCA Bootstrap UCL	709.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	926.2
		97.5% Chebyshev(Mean, Sd) UCL	1229
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1824
95% Approximate Gamma UCL	604.2		
95% Adjusted Gamma UCL	758.7		

Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	1824
Recommended UCL exceeds the maximum observation			

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_88	101-12-204	25	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics

		Log-transformed Statistics	
Minimum	3.8	Minimum of Log Data	1.335
Maximum	7.4	Maximum of Log Data	2.001
Mean	5.7	Mean of log Data	1.722
Median	5.5	SD of log Data	0.207
SD	1.131		
Coefficient of Variation	0.198		
Skewness	-0.115		

Relevant UCL Statistics

Normal Distribution Test

		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.985	Shapiro Wilk Test Statistic	0.971
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution

		Assuming Lognormal Distribution	
95% Student's-t UCL	6.401	95% H-UCL	6.581
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	7.423
95% Adjusted-CLT UCL	6.305	97.5% Chebyshev (MVUE) UCL	8.167
95% Modified-t UCL	6.399	99% Chebyshev (MVUE) UCL	9.628

Gamma Distribution Test

		Data Distribution	
k star (bias corrected)	18.25	Data appear Normal at 5% Significance Level	
Theta Star	0.312		
nu star	328.5		
Approximate Chi Square Value (.05)	287.5	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6.32
Adjusted Chi Square Value	279.4	95% Jackknife UCL	6.401
		95% Standard Bootstrap UCL	6.273
Anderson-Darling Test Statistic	0.167	95% Bootstrap-t UCL	6.406
Anderson-Darling 5% Critical Value	0.721	95% Hall's Bootstrap UCL	6.351
Kolmogorov-Smirnov Test Statistic	0.139	95% Percentile Bootstrap UCL	6.278
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6.256
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7.344
		97.5% Chebyshev(Mean, Sd) UCL	8.055
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	9.452
95% Approximate Gamma UCL	6.513		
95% Adjusted Gamma UCL	6.702		

Potential UCL to Use		Use 95% Student's-t UCL	6.401

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_89	101-12-204	25	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	207	Minimum of Log Data	5.333
Maximum	1110	Maximum of Log Data	7.012
Mean	530.4	Mean of log Data	6.142
Median	386	SD of log Data	0.545
SD	293.4		
Coefficient of Variation	0.553		
Skewness	0.974		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.903	Shapiro Wilk Test Statistic	0.962
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	712.3	95% H-UCL	852.4
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	955.9
95% Adjusted-CLT UCL	725.2	97.5% Chebyshev (MVUE) UCL	1140
95% Modified-t UCL	717.6	99% Chebyshev (MVUE) UCL	1503

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	2.705	Data appear Normal at 5% Significance Level	
Theta Star	196.1		
nu star	48.68		
Approximate Chi Square Value (.05)	33.67	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	691.3
Adjusted Chi Square Value	31.05	95% Jackknife UCL	712.3
		95% Standard Bootstrap UCL	683
Anderson-Darling Test Statistic	0.304	95% Bootstrap-t UCL	793
Anderson-Darling 5% Critical Value	0.725	95% Hall's Bootstrap UCL	746.5
Kolmogorov-Smirnov Test Statistic	0.221	95% Percentile Bootstrap UCL	694.1
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	719.6
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	956.7
		97.5% Chebyshev(Mean, Sd) UCL	1141
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1503
95% Approximate Gamma UCL	767		
95% Adjusted Gamma UCL	831.6		

Potential UCL to Use		Use 95% Student's-t UCL	712.3

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_90	101-12-204	25	Lead

General Statistics

Number of Valid Samples	9
Number of Unique Samples	9

Raw Statistics

Minimum	13.9
Maximum	110
Mean	55.83
Median	48.4
SD	31.06
Coefficient of Variation	0.556
Skewness	0.541

Log-transformed Statistics

Minimum of Log Data	2.632
Maximum of Log Data	4.7
Mean of log Data	3.862
SD of log Data	0.639

Relevant UCL Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic	0.964
Shapiro Wilk Critical Value	0.829

Data appear Normal at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.967
Shapiro Wilk Critical Value	0.829

Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

95% Student's-t UCL	75.08
95% UCLs (Adjusted for Skewness)	
95% Adjusted-CLT UCL	74.86
95% Modified-t UCL	75.4

Assuming Lognormal Distribution

95% H-UCL	103.6
95% Chebyshev (MVUE) UCL	110.7
97.5% Chebyshev (MVUE) UCL	134.1
99% Chebyshev (MVUE) UCL	179.9

Gamma Distribution Test

k star (bias corrected)	2.251
Theta Star	24.8
nu star	40.52
Approximate Chi Square Value (.05)	26.93
Adjusted Level of Significance	0.0231
Adjusted Chi Square Value	24.62
Anderson-Darling Test Statistic	0.135
Anderson-Darling 5% Critical Value	0.726
Kolmogorov-Smirnov Test Statistic	0.115
Kolmogorov-Smirnov 5% Critical Value	0.281

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% Approximate Gamma UCL	84
95% Adjusted Gamma UCL	91.89

Data Distribution

Data appear Normal at 5% Significance Level

Nonparametric Statistics

95% CLT UCL	72.86
95% Jackknife UCL	75.08
95% Standard Bootstrap UCL	72.2
95% Bootstrap-t UCL	78.88
95% Hall's Bootstrap UCL	78.68
95% Percentile Bootstrap UCL	72.68
95% BCA Bootstrap UCL	73.2
95% Chebyshev(Mean, Sd) UCL	101
97.5% Chebyshev(Mean, Sd) UCL	120.5
99% Chebyshev(Mean, Sd) UCL	158.8

Potential UCL to Use

Use 95% Student's-t UCL 75.08

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_91	101-12-267	25	Arsenic

General Statistics

Number of Valid Samples	9	Number of Unique Samples	8

Raw Statistics		**Log-transformed Statistics**	
Minimum	3.3	Minimum of Log Data	1.194
Maximum	9	Maximum of Log Data	2.197
Mean	5.711	Mean of log Data	1.702
Median	5.8	SD of log Data	0.306
SD	1.722		
Coefficient of Variation	0.301		
Skewness	0.543		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Test Statistic	0.98
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	6.778	95% H-UCL	7.159
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	8.27
95% Adjusted-CLT UCL	6.766	97.5% Chebyshev (MVUE) UCL	9.376
95% Modified-t UCL	6.795	99% Chebyshev (MVUE) UCL	11.55

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	8.338	Data appear Normal at 5% Significance Level	
Theta Star	0.685		
nu star	150.1		
Approximate Chi Square Value (.05)	122.8	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	6.655
Adjusted Chi Square Value	117.6	95% Jackknife UCL	6.778
		95% Standard Bootstrap UCL	6.592
Anderson-Darling Test Statistic	0.175	95% Bootstrap-t UCL	6.9
Anderson-Darling 5% Critical Value	0.722	95% Hall's Bootstrap UCL	7.008
Kolmogorov-Smirnov Test Statistic	0.115	95% Percentile Bootstrap UCL	6.678
Kolmogorov-Smirnov 5% Critical Value	0.279	95% BCA Bootstrap UCL	6.722
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8.212
		97.5% Chebyshev(Mean, Sd) UCL	9.295
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	11.42
95% Approximate Gamma UCL	6.982		
95% Adjusted Gamma UCL	7.291		

Potential UCL to Use		Use 95% Student's-t UCL	6.778

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_92	101-12-267	25	Copper

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	102	Minimum of Log Data	4.625
Maximum	489	Maximum of Log Data	6.192
Mean	290.3	Mean of log Data	5.569
Median	327	SD of log Data	0.514
SD	123.4		
Coefficient of Variation	0.425		
Skewness	-0.187		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.941	Shapiro Wilk Test Statistic	0.89
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	366.8	95% H-UCL	456.2
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	517.4
95% Adjusted-CLT UCL	355.3	97.5% Chebyshev (MVUE) UCL	613.9
95% Modified-t UCL	366.4	99% Chebyshev (MVUE) UCL	803.5

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	3.437	Data appear Normal at 5% Significance Level	
Theta Star	84.48		
nu star	61.86		
Approximate Chi Square Value (.05)	44.77	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	358
Adjusted Chi Square Value	41.72	95% Jackknife UCL	366.8
		95% Standard Bootstrap UCL	354.4
Anderson-Darling Test Statistic	0.494	95% Bootstrap-t UCL	359.1
Anderson-Darling 5% Critical Value	0.723	95% Hall's Bootstrap UCL	354.4
Kolmogorov-Smirnov Test Statistic	0.263	95% Percentile Bootstrap UCL	351.9
Kolmogorov-Smirnov 5% Critical Value	0.28	95% BCA Bootstrap UCL	353.3
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	469.7
		97.5% Chebyshev(Mean, Sd) UCL	547.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	699.7
95% Approximate Gamma UCL	401.2		
95% Adjusted Gamma UCL	430.5		

Potential UCL to Use		Use 95% Student's-t UCL	366.8

General UCL Statistics for Data Sets with Non-Detects

DRAFT - 11/07/07

User Selected Options

From File	C:\lhilsche\Asarco Hayden\oct07\EPCs8\all8.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

	Parcel	Zone	Parameter
_93	101-12-267	25	Lead

General Statistics

Number of Valid Samples	9	Number of Unique Samples	9

Raw Statistics		**Log-transformed Statistics**	
Minimum	37.5	Minimum of Log Data	3.624
Maximum	216	Maximum of Log Data	5.375
Mean	77.73	Mean of log Data	4.139
Median	44.1	SD of log Data	0.648
SD	61.34		
Coefficient of Variation	0.789		
Skewness	1.726		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.708	Shapiro Wilk Test Statistic	0.765
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	115.8	95% H-UCL	139
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	147.8
95% Adjusted-CLT UCL	123.9	97.5% Chebyshev (MVUE) UCL	179.2
95% Modified-t UCL	117.7	99% Chebyshev (MVUE) UCL	240.8

Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.735	Data do not follow a Discernable Distribution (0.05)	
Theta Star	44.8		
nu star	31.23		
Approximate Chi Square Value (.05)	19.47	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0231	95% CLT UCL	111.4
Adjusted Chi Square Value	17.53	95% Jackknife UCL	115.8
		95% Standard Bootstrap UCL	109.7
Anderson-Darling Test Statistic	1.155	95% Bootstrap-t UCL	148.9
Anderson-Darling 5% Critical Value	0.728	95% Hall's Bootstrap UCL	117.8
Kolmogorov-Smirnov Test Statistic	0.376	95% Percentile Bootstrap UCL	110.6
Kolmogorov-Smirnov 5% Critical Value	0.282	95% BCA Bootstrap UCL	123.3
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	166.9
		97.5% Chebyshev(Mean, Sd) UCL	205.4
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	281.2
95% Approximate Gamma UCL	124.7		
95% Adjusted Gamma UCL	138.5		

Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	166.9

Summary Statistics

Hayden and Winkelman

Residential Properties

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-1	Summary Statistics for Surface Soil - CLP Data Only (AS, Pb, Cu); Hayden, Residential Zones 1 to 17
Table A-2	Summary Statistics for Surface Soil - CLP Data Only (AS, Pb, Cu); Winkelman, Residential Zones 18 to 25
Table A-3	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-185C
Table A-4	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-185C
Table A-5	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-193A
Table A-6	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-193A
Table A-7	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-216
Table A-8	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-216
Table A-9	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 1
Table A-10	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 1
Table A-11	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-176
Table A-12	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-176
Table A-13	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-202
Table A-14	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-202
Table A-15	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-242
Table A-16	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-242
Table A-17	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-244
Table A-18	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-244
Table A-19	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-247
Table A-20	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-247
Table A-21	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 2
Table A-22	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 2
Table A-23	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-219
Table A-24	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-219
Table A-25	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-234

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-26	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-234
Table A-27	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-236
Table A-28	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-236
Table A-29	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 3
Table A-30	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 3
Table A-31	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-142A
Table A-32	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-142A
Table A-33	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-149
Table A-34	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-149
Table A-35	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-251
Table A-36	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-251
Table A-37	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-259
Table A-38	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-259
Table A-39	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 4
Table A-40	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 4
Table A-41	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-129
Table A-42	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-129
Table A-43	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-301
Table A-44	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-301
Table A-45	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-303
Table A-46	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-303
Table A-47	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-304A
Table A-48	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-304A
Table A-49	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 5
Table A-50	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 5

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-51	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-111
Table A-52	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-111
Table A-53	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-117
Table A-54	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-117
Table A-55	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-284
Table A-56	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-284
Table A-57	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-286
Table A-58	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-286
Table A-59	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 6
Table A-60	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 6
Table A-61	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-099
Table A-62	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-099
Table A-63	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-104
Table A-64	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-104
Table A-65	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-270
Table A-66	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-270
Table A-67	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 7
Table A-68	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 7
Table A-69	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-090
Table A-70	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-090
Table A-71	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-091
Table A-72	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-091
Table A-73	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-092A
Table A-74	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-092A
Table A-75	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-105

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-76	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-105
Table A-77	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-110
Table A-78	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-110
Table A-79	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 8
Table A-80	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 8
Table A-81	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-035AN
Table A-82	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-035AN
Table A-83	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-037
Table A-84	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-037
Table A-85	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-040
Table A-86	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-040
Table A-87	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-052
Table A-88	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-052
Table A-89	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-060
Table A-90	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-060
Table A-91	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-061
Table A-92	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-061
Table A-93	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-062
Table A-94	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-062
Table A-95	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089K
Table A-96	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089K
Table A-97	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089Q
Table A-98	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089Q
Table A-99	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089S
Table A-100	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089S

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-101	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089T
Table A-102	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089T
Table A-103	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089U
Table A-104	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089U
Table A-105	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 9
Table A-106	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 9
Table A-107	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-008
Table A-108	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-008
Table A-109	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-010
Table A-110	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-010
Table A-111	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-014
Table A-112	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-014
Table A-113	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-018
Table A-114	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-018
Table A-115	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-027
Table A-116	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-027
Table A-117	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-028
Table A-118	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-028
Table A-119	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-029
Table A-120	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-029
Table A-121	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-030
Table A-122	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-030
Table A-123	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-034
Table A-124	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-034
Table A-125	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AE

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-126	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AE
Table A-127	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AS
Table A-128	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AS
Table A-129	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-041
Table A-130	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-041
Table A-131	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-042
Table A-132	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-042
Table A-133	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-046
Table A-134	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-046
Table A-135	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-047
Table A-136	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-047
Table A-137	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-050A
Table A-138	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-050A
Table A-139	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Table A-140	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Table A-141	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-065
Table A-142	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-065
Table A-143	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-066
Table A-144	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-066
Table A-145	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-082
Table A-146	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-082
Table A-147	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-09-014
Table A-148	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-09-014
Table A-149	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 11
Table A-150	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 11

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-151	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-004
Table A-152	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-004
Table A-153	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-008
Table A-154	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-008
Table A-155	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-010
Table A-156	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-010
Table A-157	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-025A
Table A-158	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-025A
Table A-159	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-027
Table A-160	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-027
Table A-161	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-032
Table A-162	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-032
Table A-163	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-033
Table A-164	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-033
Table A-165	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 12
Table A-166	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 12
Table A-167	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-059
Table A-168	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-059
Table A-169	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-062
Table A-170	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-062
Table A-171	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-064
Table A-172	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-064
Table A-173	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-067
Table A-174	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-067
Table A-175	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-068

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-176	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-068
Table A-177	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-070
Table A-178	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-070
Table A-179	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-072
Table A-180	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-072
Table A-181	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 13
Table A-182	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 13
Table A-183	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-036
Table A-184	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-036
Table A-185	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-038
Table A-186	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-038
Table A-187	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-039
Table A-188	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-039
Table A-189	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-042
Table A-190	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-042
Table A-191	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-045
Table A-192	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-045
Table A-193	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-047
Table A-194	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-047
Table A-195	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-054
Table A-196	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-054
Table A-197	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-077
Table A-198	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-077
Table A-199	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 14
Table A-200	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 14

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-201	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-083
Table A-202	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-083
Table A-203	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-084
Table A-204	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-084
Table A-205	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-088
Table A-206	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-088
Table A-207	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-134
Table A-208	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-134
Table A-209	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 15
Table A-210	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 15
Table A-211	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-104
Table A-212	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-104
Table A-213	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-106
Table A-214	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-106
Table A-215	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-107
Table A-216	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-107
Table A-217	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-108
Table A-218	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-108
Table A-219	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-109
Table A-220	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-109
Table A-221	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-111B
Table A-222	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-111B
Table A-223	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-137
Table A-224	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-137
Table A-225	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-140

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-226	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-140
Table A-227	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 16
Table A-228	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 16
Table A-229	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-115
Table A-230	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-115
Table A-231	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-120
Table A-232	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-120
Table A-233	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 17
Table A-234	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 17
Table A-235	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008F
Table A-236	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008F
Table A-237	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008J
Table A-238	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008J
Table A-239	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008K
Table A-240	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008K
Table A-241	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-023A
Table A-242	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-023A
Table A-243	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-288
Table A-244	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-288
Table A-245	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 18
Table A-246	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 18
Table A-247	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-071
Table A-248	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-071
Table A-249	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-073
Table A-250	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-073

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-251	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-075
Table A-252	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-075
Table A-253	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-101A
Table A-254	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-101A
Table A-255	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-102
Table A-256	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-102
Table A-257	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 19
Table A-258	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 19
Table A-259	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-093
Table A-260	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-093
Table A-261	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-094A
Table A-262	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-094A
Table A-263	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-108
Table A-264	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-108
Table A-265	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 20
Table A-266	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 20
Table A-267	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-130
Table A-268	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-130
Table A-269	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-142
Table A-270	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-142
Table A-271	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-149
Table A-272	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-149
Table A-273	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-150
Table A-274	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-150
Table A-275	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 21

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-276	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 21
Table A-277	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-136
Table A-278	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-136
Table A-279	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-147A
Table A-280	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-147A
Table A-281	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-187
Table A-282	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-187
Table A-283	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-188B
Table A-284	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-188B
Table A-285	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 22
Table A-286	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 22
Table A-287	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-193
Table A-288	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-193
Table A-289	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-234
Table A-290	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-234
Table A-291	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-236
Table A-292	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-236
Table A-293	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 23
Table A-294	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 23
Table A-295	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-019
Table A-296	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-019
Table A-297	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-023
Table A-298	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-023
Table A-299	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-12-241
Table A-300	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-12-241

Appendix A - Table of Contents
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Table No.	Title
Table A-301	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 24
Table A-302	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 24
Table A-303	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-154A
Table A-304	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-154A
Table A-305	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-155
Table A-306	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-155
Table A-307	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-204
Table A-308	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-204
Table A-309	Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-267
Table A-310	Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-267
Table A-311	Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 25
Table A-312	Summary of Residential Cancer Risks and Noncancer Hazards - Zone 25

Table A-1
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Hayden, Residential Zones 1 to 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-07-185C	1	Arsenic	9	9	100	mg/kg	6.2	9.8	F	8.29	1.18	9.02	95% Student's-t UCL	9.02	95% Student's-t UCL
101-07-185C	1	Copper	9	9	100	mg/kg	914	2,450	H	1,510	527	1,830	95% Student's-t UCL	1,830	95% Student's-t UCL
101-07-185C	1	Lead	9	9	100	mg/kg	30.7	57.5	H	46.1	9.28	51.8	95% Student's-t UCL	51.8	95% Student's-t UCL
101-07-193A	1	Arsenic	9	9	100	mg/kg	8	16.8	C	12.5	2.97	14.4	95% Student's-t UCL	14.4	95% Student's-t UCL
101-07-193A	1	Copper	9	9	100	mg/kg	733	2,430	C	1,770	513	2,090	95% Student's-t UCL	2,090	95% Student's-t UCL
101-07-193A	1	Lead	9	9	100	mg/kg	48.4	173	H	94.6	39.6	119	95% Student's-t UCL	119	95% Student's-t UCL
101-07-216	1	Arsenic	9	9	100	mg/kg	5.3	35.8	G	14.1	9.04	20.7	95% Approximate Gamma UCL	20.7	95% Approximate Gamma UCL
101-07-216	1	Copper	9	9	100	mg/kg	411	2,520	G	1,740	781	2,230	95% Student's-t UCL	2,230	95% Student's-t UCL
101-07-216	1	Lead	9	9	100	mg/kg	57.1	1,100	G	286	333	571	95% Approximate Gamma UCL	571	95% Approximate Gamma UCL
101-07-176	2	Arsenic	9	9	100	mg/kg	8.4	213	E	34.9	66.9	132	95% Chebyshev (Mean, Sd) UCL	132	95% Chebyshev (Mean, Sd) UCL
101-07-176	2	Copper	9	9	100	mg/kg	1,250	5,600	A	2,520	1,430	3,410	95% Student's-t UCL	3,410	95% Student's-t UCL
101-07-176	2	Lead	9	9	100	mg/kg	45.5	213	E	93.9	52.9	127	95% Student's-t UCL	127	95% Student's-t UCL
101-07-202	2	Arsenic	8	9	89	mg/kg	3	15.3	C	7.5	5.21	10.8	95% KM (t) UCL	10.8	95% KM (t) UCL
101-07-202	2	Copper	9	9	100	mg/kg	186	3,040	C	1,250	997	1,870	95% Student's-t UCL	1,870	95% Student's-t UCL
101-07-202	2	Lead	9	9	100	mg/kg	13.1	119	E	63.6	42.9	90.2	95% Student's-t UCL	90.2	95% Student's-t UCL
101-07-242	2	Arsenic	9	9	100	mg/kg	12	21.3	D	14.9	3.22	16.9	95% Student's-t UCL	16.9	95% Student's-t UCL
101-07-242	2	Copper	9	9	100	mg/kg	647	6,530	D	3,280	1,990	4,510	95% Student's-t UCL	4,510	95% Student's-t UCL
101-07-242	2	Lead	9	9	100	mg/kg	50.3	168	F	120	36.2	142	95% Student's-t UCL	142	95% Student's-t UCL
101-07-244	2	Arsenic	9	9	100	mg/kg	4.8	14.4	B	9.34	3.07	11.3	95% Student's-t UCL	11.3	95% Student's-t UCL
101-07-244	2	Copper	9	9	100	mg/kg	1,230	4,270	F	2,310	981	2,920	95% Student's-t UCL	2,920	95% Student's-t UCL
101-07-244	2	Lead	9	9	100	mg/kg	51.2	196	B	122	52	154	95% Student's-t UCL	154	95% Student's-t UCL
101-07-247	2	Arsenic	9	9	100	mg/kg	2.7	12.5	C	8.19	3.17	10.2	95% Student's-t UCL	10.2	95% Student's-t UCL
101-07-247	2	Copper	9	9	100	mg/kg	798	3,200	C	2,020	849	2,550	95% Student's-t UCL	2,550	95% Student's-t UCL
101-07-247	2	Lead	9	9	100	mg/kg	41.6	840	H	232	242	431	95% Approximate Gamma UCL	431	95% Approximate Gamma UCL
101-07-219	3	Arsenic	9	9	100	mg/kg	6.9	25.8	E	16.3	5.94	20	95% Student's-t UCL	20	95% Student's-t UCL
101-07-219	3	Copper	9	9	100	mg/kg	1,770	4,910	A	3,350	1,050	4,000	95% Student's-t UCL	4,000	95% Student's-t UCL
101-07-219	3	Lead	9	9	100	mg/kg	60	212	G	125	42.7	152	95% Student's-t UCL	152	95% Student's-t UCL
101-07-234	3	Arsenic	9	9	100	mg/kg	5.5	13.3	H	8.68	2.47	10.2	95% Student's-t UCL	10.2	95% Student's-t UCL
101-07-234	3	Copper	9	9	100	mg/kg	1,510	4,150	H	2,260	797	2,790	95% Approximate Gamma UCL	2,790	95% Approximate Gamma UCL
101-07-234	3	Lead	9	9	100	mg/kg	26.3	352	E	97.6	99	169	95% Approximate Gamma UCL	169	95% Approximate Gamma UCL
101-07-236	3	Arsenic	9	9	100	mg/kg	7.9	50.6	F	19.5	12.5	28.4	95% Approximate Gamma UCL	28.4	95% Approximate Gamma UCL
101-07-236	3	Copper	9	9	100	mg/kg	1,090	7,900	F	4,060	1,970	5,290	95% Student's-t UCL	5,290	95% Student's-t UCL
101-07-236	3	Lead	9	9	100	mg/kg	60.8	381	F	182	86.9	236	95% Student's-t UCL	236	95% Student's-t UCL
101-07-142A	4	Arsenic	9	9	100	mg/kg	0.51	31.5	D	10.8	9.4	16.6	95% Student's-t UCL	16.6	95% Student's-t UCL
101-07-142A	4	Copper	9	9	100	mg/kg	268	4,690	D	1,620	1,450	2,520	95% Student's-t UCL	2,520	95% Student's-t UCL
101-07-142A	4	Lead	9	9	100	mg/kg	17.1	185	D	84.5	63	124	95% Student's-t UCL	124	95% Student's-t UCL
101-07-149	4	Arsenic	9	9	100	mg/kg	5.4	33.6	B	16	7.79	20.8	95% Student's-t UCL	20.8	95% Student's-t UCL
101-07-149	4	Copper	9	9	100	mg/kg	1,770	10,300	B	3,870	2,570	5,660	95% Approximate Gamma UCL	5,660	95% Approximate Gamma UCL
101-07-149	4	Lead	9	9	100	mg/kg	55.6	424	B	175	124	252	95% Student's-t UCL	252	95% Student's-t UCL
101-07-251	4	Arsenic	9	9	100	mg/kg	5.5	24.2	H	12.8	5.66	16.3	95% Student's-t UCL	16.3	95% Student's-t UCL
101-07-251	4	Copper	9	9	100	mg/kg	1,280	4,480	I	3,060	1,140	3,760	95% Student's-t UCL	3,760	95% Student's-t UCL
101-07-251	4	Lead	9	9	100	mg/kg	68.5	238	H	144	56.5	185	95% Approximate Gamma UCL	185	95% Approximate Gamma UCL
101-07-259	4	Arsenic	9	9	100	mg/kg	3.2	17.2	I	9.96	5.59	13.4	95% Student's-t UCL	13.4	95% Student's-t UCL
101-07-259	4	Copper	9	9	100	mg/kg	538	4,980	A	2,420	1,500	3,350	95% Student's-t UCL	3,350	95% Student's-t UCL

Table A-1
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Hayden, Residential Zones 1 to 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-07-259	4	Lead	9	9	100	mg/kg	31.2	167	F	77	45	105	95% Student's-t UCL	105	95% Student's-t UCL
101-07-129	5	Arsenic	9	9	100	mg/kg	5.1	33.7	B	20.2	8.76	25.6	95% Student's-t UCL	25.6	95% Student's-t UCL
101-07-129	5	Copper	9	9	100	mg/kg	2,260	9,620	B	5,120	2,230	6,500	95% Student's-t UCL	6,500	95% Student's-t UCL
101-07-129	5	Lead	9	9	100	mg/kg	71.9	348	B	218	102	281	95% Student's-t UCL	281	95% Student's-t UCL
101-07-301	5	Arsenic	9	9	100	mg/kg	13.7	24.6	B	20.2	3.69	22.5	95% Student's-t UCL	22.5	95% Student's-t UCL
101-07-301	5	Copper	9	9	100	mg/kg	4,890	12,000	B	8,070	2,150	9,400	95% Student's-t UCL	9,400	95% Student's-t UCL
101-07-301	5	Lead	9	9	100	mg/kg	118	941	G	248	261	627	95% Chebyshev (Mean, Sd) UCL	627	95% Chebyshev (Mean, Sd) UCL
101-07-303	5	Arsenic	9	9	100	mg/kg	5	20.7	A	10.9	5.28	14.2	95% Student's-t UCL	14.2	95% Student's-t UCL
101-07-303	5	Copper	9	9	100	mg/kg	726	17,200	B	4,710	5,850	10,500	95% Approximate Gamma UCL	10,500	95% Approximate Gamma UCL
101-07-303	5	Lead	9	9	100	mg/kg	25	258	I	89.5	77.1	152	95% Approximate Gamma UCL	152	95% Approximate Gamma UCL
101-07-304A	5	Arsenic	9	9	100	mg/kg	3.5	34.8	H	17.9	10.8	24.6	95% Student's-t UCL	24.6	95% Student's-t UCL
101-07-304A	5	Copper	9	9	100	mg/kg	879	10,700	H	4,520	3,270	6,550	95% Student's-t UCL	6,550	95% Student's-t UCL
101-07-304A	5	Lead	9	9	100	mg/kg	22.2	195	H	97.4	57.4	133	95% Student's-t UCL	133	95% Student's-t UCL
101-07-111	6	Arsenic	9	9	100	mg/kg	3	21.3	B	11.6	6.05	15.3	95% Student's-t UCL	15.3	95% Student's-t UCL
101-07-111	6	Copper	9	9	100	mg/kg	1,220	9,500	A	4,670	2,790	6,400	95% Student's-t UCL	6,400	95% Student's-t UCL
101-07-111	6	Lead	9	9	100	mg/kg	19.2	150	E	71.2	47.1	100	95% Student's-t UCL	100	95% Student's-t UCL
101-07-117	6	Arsenic	9	9	100	mg/kg	16.3	42.6	G	29.6	10.3	36	95% Student's-t UCL	36	95% Student's-t UCL
101-07-117	6	Copper	9	9	100	mg/kg	2,580	13,800	B	8,720	4,080	11,300	95% Student's-t UCL	11,300	95% Student's-t UCL
101-07-117	6	Lead	9	9	100	mg/kg	53.4	389	B	242	113	312	95% Student's-t UCL	312	95% Student's-t UCL
101-07-284	6	Arsenic	9	9	100	mg/kg	10.8	20.7	I	15.8	3.45	18	95% Student's-t UCL	18	95% Student's-t UCL
101-07-284	6	Copper	9	9	100	mg/kg	3,390	7,100	A	5,740	1,190	6,480	95% Student's-t UCL	6,480	95% Student's-t UCL
101-07-284	6	Lead	9	9	100	mg/kg	71.1	224	A	143	43.9	170	95% Student's-t UCL	170	95% Student's-t UCL
101-07-286	6	Arsenic	9	9	100	mg/kg	13	23.8	H	18	3.84	20.4	95% Student's-t UCL	20.4	95% Student's-t UCL
101-07-286	6	Copper	9	9	100	mg/kg	1,460	8,230	H	5,520	2,270	6,930	95% Student's-t UCL	6,930	95% Student's-t UCL
101-07-286	6	Lead	9	9	100	mg/kg	33.5	262	A	180	72.3	225	95% Student's-t UCL	225	95% Student's-t UCL
101-07-099	7	Arsenic	9	9	100	mg/kg	11.1	91.9	G	43.3	23.6	58	95% Student's-t UCL	58	95% Student's-t UCL
101-07-099	7	Copper	9	9	100	mg/kg	3,020	18,000	I	11,600	5,120	14,800	95% Student's-t UCL	14,800	95% Student's-t UCL
101-07-099	7	Lead	9	9	100	mg/kg	104	688	I	296	177	406	95% Student's-t UCL	406	95% Student's-t UCL
101-07-104	7	Arsenic	9	9	100	mg/kg	10.3	25.4	G	18	5.37	21.4	95% Student's-t UCL	21.4	95% Student's-t UCL
101-07-104	7	Copper	9	9	100	mg/kg	1,760	18,800	C	6,960	4,930	10,900	95% Approximate Gamma UCL	10,900	95% Approximate Gamma UCL
101-07-104	7	Lead	9	9	100	mg/kg	37	630	B	156	185	297	95% Approximate Gamma UCL	297	95% Approximate Gamma UCL
101-07-270	7	Arsenic	9	9	100	mg/kg	9	80.3	D	39.7	28.9	57.7	95% Student's-t UCL	57.7	95% Student's-t UCL
101-07-270	7	Copper	9	9	100	mg/kg	1,160	17,500	G	10,600	7,030	33,900	99% Chebyshev (Mean, Sd) UCL	17,500	Maximum Result
101-07-270	7	Lead	9	9	100	mg/kg	34.6	1,340	G	513	497	1,080	95% Approximate Gamma UCL	1,080	95% Approximate Gamma UCL
101-07-090	8	Arsenic	9	9	100	mg/kg	14.9	68.9	H	37.3	17.8	48.4	95% Student's-t UCL	48.4	95% Student's-t UCL
101-07-090	8	Copper	9	9	100	mg/kg	6,770	21,200	I	13,000	4,970	16,100	95% Student's-t UCL	16,100	95% Student's-t UCL
101-07-090	8	Lead	9	9	100	mg/kg	38.8	319	G	189	85.4	241	95% Student's-t UCL	241	95% Student's-t UCL
101-07-091	8	Arsenic	9	9	100	mg/kg	3.1	72.9	D	28.3	26.9	45	95% Student's-t UCL	45	95% Student's-t UCL
101-07-091	8	Copper	9	9	100	mg/kg	1,330	33,300	C	10,200	11,300	22,300	95% Approximate Gamma UCL	22,300	95% Approximate Gamma UCL
101-07-091	8	Lead	9	9	100	mg/kg	24.1	358	D	124	117	250	95% Approximate Gamma UCL	250	95% Approximate Gamma UCL
101-07-092A	8	Arsenic	9	9	100	mg/kg	6.1	44.1	I	22.8	13.7	31.3	95% Student's-t UCL	31.3	95% Student's-t UCL
101-07-092A	8	Copper	9	9	100	mg/kg	1,600	14,400	I	7,640	3,940	10,100	95% Student's-t UCL	10,100	95% Student's-t UCL
101-07-092A	8	Lead	9	9	100	mg/kg	35.1	276	H	146	99.6	208	95% Student's-t UCL	208	95% Student's-t UCL
101-07-105	8	Arsenic	9	9	100	mg/kg	9.5	44.4	B	27.1	10.5	33.6	95% Student's-t UCL	33.6	95% Student's-t UCL

Table A-1
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Hayden, Residential Zones 1 to 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-07-105	8	Copper	9	9	100	mg/kg	3,530	31,600	C	10,500	8,150	17,100	95% H-UCL	17,100	95% H-UCL
101-07-105	8	Lead	9	9	100	mg/kg	59.1	1,740	F	414	528	867	95% Approximate Gamma UCL	867	95% Approximate Gamma UCL
101-07-110	8	Arsenic	9	9	100	mg/kg	3.3	25.1	D	10.6	6.58	14.6	95% Student's-t UCL	14.6	95% Student's-t UCL
101-07-110	8	Copper	9	9	100	mg/kg	746	7,550	D	3,690	2,190	5,050	95% Student's-t UCL	5,050	95% Student's-t UCL
101-07-110	8	Lead	9	9	100	mg/kg	10.8	93	D	40.5	25.3	56.2	95% Student's-t UCL	56.2	95% Student's-t UCL
101-07-035AN	9	Arsenic	9	9	100	mg/kg	12.8	67.3	D	27	19.8	55.7	95% Chebyshev (Mean, Sd) UCL	55.7	95% Chebyshev (Mean, Sd) UCL
101-07-035AN	9	Copper	9	9	100	mg/kg	7,220	31,100	C	12,900	8,000	17,900	95% Student's-t UCL	17,900	95% Student's-t UCL
101-07-035AN	9	Lead	9	9	100	mg/kg	14.1	156	D	84.4	50.9	116	95% Student's-t UCL	116	95% Student's-t UCL
101-07-037	9	Arsenic	9	9	100	mg/kg	9.9	83.6	A	43	21.2	56.1	95% Student's-t UCL	56.1	95% Student's-t UCL
101-07-037	9	Copper	9	9	100	mg/kg	2,270	23,900	A	12,500	6,380	16,500	95% Student's-t UCL	16,500	95% Student's-t UCL
101-07-037	9	Lead	9	9	100	mg/kg	83.1	3,270	I	658	1000	1,470	95% Approximate Gamma UCL	1,470	95% Approximate Gamma UCL
101-07-040	9	Arsenic	9	9	100	mg/kg	11	98.3	I	37	28.2	54.5	95% Student's-t UCL	54.5	95% Student's-t UCL
101-07-040	9	Copper	9	9	100	mg/kg	3,330	41,800	I	14,000	11,600	23,400	95% Approximate Gamma UCL	23,400	95% Approximate Gamma UCL
101-07-040	9	Lead	9	9	100	mg/kg	58.9	362	I	144	93.9	217	95% Approximate Gamma UCL	217	95% Approximate Gamma UCL
101-07-052	9	Arsenic	9	9	100	mg/kg	8	56.2	D	27.7	14.4	36.6	95% Student's-t UCL	36.6	95% Student's-t UCL
101-07-052	9	Copper	9	9	100	mg/kg	2,480	15,900	D	8,750	4,350	11,400	95% Student's-t UCL	11,400	95% Student's-t UCL
101-07-052	9	Lead	9	9	100	mg/kg	44.1	363	D	174	102	237	95% Student's-t UCL	237	95% Student's-t UCL
101-07-060	9	Arsenic	9	9	100	mg/kg	11.6	31.9	B	18.4	6.17	22.3	95% Student's-t UCL	22.3	95% Student's-t UCL
101-07-060	9	Copper	9	9	100	mg/kg	3,120	8,120	C	5,480	1,770	6,580	95% Student's-t UCL	6,580	95% Student's-t UCL
101-07-060	9	Lead	9	9	100	mg/kg	114	1,010	F	264	284	676	95% Chebyshev (Mean, Sd) UCL	676	95% Chebyshev (Mean, Sd) UCL
101-07-061	9	Arsenic	9	9	100	mg/kg	4.6	44.3	E	16.6	13.6	27.6	95% Approximate Gamma UCL	27.6	95% Approximate Gamma UCL
101-07-061	9	Copper	9	9	100	mg/kg	1,330	8,990	D	4,280	2,260	5,680	95% Student's-t UCL	5,680	95% Student's-t UCL
101-07-061	9	Lead	9	9	100	mg/kg	29.2	276	D	88.6	83.6	210	95% Chebyshev (Mean, Sd) UCL	210	95% Chebyshev (Mean, Sd) UCL
101-07-062	9	Arsenic	9	9	100	mg/kg	10.1	58.5	F	24.7	18.5	43.4	95% H-UCL	43.4	95% H-UCL
101-07-062	9	Copper	9	9	100	mg/kg	2,930	13,600	G	6,510	3,780	8,860	95% Student's-t UCL	8,860	95% Student's-t UCL
101-07-062	9	Lead	9	9	100	mg/kg	70.3	268	F	126	77.5	239	95% Chebyshev (Mean, Sd) UCL	239	95% Chebyshev (Mean, Sd) UCL
101-07-089K	9	Arsenic	9	9	100	mg/kg	21.7	157	C	50	43.9	87.2	95% H-UCL	87.2	95% H-UCL
101-07-089K	9	Copper	9	9	100	mg/kg	6,140	14,800	I	9,100	2,820	10,900	95% Student's-t UCL	10,900	95% Student's-t UCL
101-07-089K	9	Lead	9	9	100	mg/kg	82.2	1,530	G	314	464	662	95% Approximate Gamma UCL	662	95% Approximate Gamma UCL
101-07-089Q	9	Arsenic	9	9	100	mg/kg	4.7	58.6	G	25.3	20	37.7	95% Student's-t UCL	37.7	95% Student's-t UCL
101-07-089Q	9	Copper	9	9	100	mg/kg	3,930	45,900	F	12,400	13,200	22,100	95% Approximate Gamma UCL	22,100	95% Approximate Gamma UCL
101-07-089Q	9	Lead	9	9	100	mg/kg	24.7	259	D	89.2	77.1	156	95% Approximate Gamma UCL	156	95% Approximate Gamma UCL
101-07-089S	9	Arsenic	9	9	100	mg/kg	15.1	87.9	D	53	21.7	66.5	95% Student's-t UCL	66.5	95% Student's-t UCL
101-07-089S	9	Copper	9	9	100	mg/kg	3,760	25,200	D	15,800	7,740	20,600	95% Student's-t UCL	20,600	95% Student's-t UCL
101-07-089S	9	Lead	9	9	100	mg/kg	47.7	276	D	184	73.5	230	95% Student's-t UCL	230	95% Student's-t UCL
101-07-089T	9	Arsenic	9	9	100	mg/kg	32.4	865	I	149	269	540	95% Chebyshev (Mean, Sd) UCL	540	95% Chebyshev (Mean, Sd) UCL
101-07-089T	9	Copper	9	9	100	mg/kg	5,360	23,400	A	15,200	6,950	19,500	95% Student's-t UCL	19,500	95% Student's-t UCL
101-07-089T	9	Lead	9	9	100	mg/kg	102	436	I	199	107	265	95% Student's-t UCL	265	95% Student's-t UCL
101-07-089U	9	Arsenic	9	9	100	mg/kg	13.8	59.9	A	40.8	15	50.2	95% Student's-t UCL	50.2	95% Student's-t UCL
101-07-089U	9	Copper	9	9	100	mg/kg	3,970	20,900	A	13,900	5,630	17,300	95% Student's-t UCL	17,300	95% Student's-t UCL
101-07-089U	9	Lead	9	9	100	mg/kg	42.9	236	A	129	55.6	163	95% Student's-t UCL	163	95% Student's-t UCL
101-07-008	10	Arsenic	9	9	100	mg/kg	19.7	113	D	51.3	28.3	68.9	95% Student's-t UCL	68.9	95% Student's-t UCL
101-07-008	10	Copper	9	9	100	mg/kg	6,410	20,200	D	11,700	4,440	14,400	95% Student's-t UCL	14,400	95% Student's-t UCL
101-07-008	10	Lead	9	9	100	mg/kg	140	810	F	347	199	470	95% Student's-t UCL	470	95% Student's-t UCL

Table A-1
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Hayden, Residential Zones 1 to 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-07-010	10	Arsenic	9	9	100	mg/kg	10.2	51.5	A	30.2	14	38.9	95% Student's-t UCL	38.9	95% Student's-t UCL
101-07-010	10	Copper	9	9	100	mg/kg	1,960	15,700	A	8,820	3,920	11,200	95% Student's-t UCL	11,200	95% Student's-t UCL
101-07-010	10	Lead	9	9	100	mg/kg	36.2	450	B	202	141	290	95% Student's-t UCL	290	95% Student's-t UCL
101-07-014	10	Arsenic	9	9	100	mg/kg	10.1	53.7	A	25.7	15.4	37.8	95% Approximate Gamma UCL	37.8	95% Approximate Gamma UCL
101-07-014	10	Copper	9	9	100	mg/kg	2,650	13,400	A	8,020	3,490	10,200	95% Student's-t UCL	10,200	95% Student's-t UCL
101-07-014	10	Lead	9	9	100	mg/kg	82	705	I	417	213	549	95% Student's-t UCL	549	95% Student's-t UCL
101-07-018	10	Arsenic	9	9	100	mg/kg	13.7	56.4	I	27.8	14.3	36.7	95% Student's-t UCL	36.7	95% Student's-t UCL
101-07-018	10	Copper	9	9	100	mg/kg	2,760	11,000	H	6,410	2,200	7,770	95% Student's-t UCL	7,770	95% Student's-t UCL
101-07-018	10	Lead	9	9	100	mg/kg	173	1,290	B	531	456	947	95% Approximate Gamma UCL	947	95% Approximate Gamma UCL
101-07-027	10	Arsenic	9	9	100	mg/kg	13.6	35.4	H	23.8	8.13	28.8	95% Student's-t UCL	28.8	95% Student's-t UCL
101-07-027	10	Copper	9	9	100	mg/kg	3,870	8,870	H	6,010	1,540	6,970	95% Student's-t UCL	6,970	95% Student's-t UCL
101-07-027	10	Lead	9	9	100	mg/kg	103	237	H	166	41.8	192	95% Student's-t UCL	192	95% Student's-t UCL
101-07-028	10	Arsenic	9	9	100	mg/kg	15.7	56.5	G	35.8	14.4	44.7	95% Student's-t UCL	44.7	95% Student's-t UCL
101-07-028	10	Copper	9	9	100	mg/kg	3,140	17,500	D	8,320	5,040	12,400	95% Approximate Gamma UCL	12,400	95% Approximate Gamma UCL
101-07-028	10	Lead	9	9	100	mg/kg	86.9	1,180	G	310	341	644	95% H-UCL	644	95% H-UCL
101-07-029	10	Arsenic	9	9	100	mg/kg	25.3	62.1	G	44.3	12.2	51.9	95% Student's-t UCL	51.9	95% Student's-t UCL
101-07-029	10	Copper	9	9	100	mg/kg	2,880	17,800	I	9,680	3,910	12,100	95% Student's-t UCL	12,100	95% Student's-t UCL
101-07-029	10	Lead	9	9	100	mg/kg	74.1	691	E	363	194	483	95% Student's-t UCL	483	95% Student's-t UCL
101-07-030	10	Arsenic	9	9	100	mg/kg	8.2	41.2	H	24.1	12.8	32.1	95% Student's-t UCL	32.1	95% Student's-t UCL
101-07-030	10	Copper	9	9	100	mg/kg	1,560	18,100	I	9,290	5,840	12,900	95% Student's-t UCL	12,900	95% Student's-t UCL
101-07-030	10	Lead	9	9	100	mg/kg	51	333	H	177	98.9	238	95% Student's-t UCL	238	95% Student's-t UCL
101-07-034	10	Arsenic	9	9	100	mg/kg	24.8	123	F	37.9	32	84.5	95% Chebyshev (Mean, Sd) UCL	84.5	95% Chebyshev (Mean, Sd) UCL
101-07-034	10	Copper	9	9	100	mg/kg	5,220	32,700	F	10,400	8,660	16,200	95% Approximate Gamma UCL	16,200	95% Approximate Gamma UCL
101-07-034	10	Lead	9	9	100	mg/kg	128	788	F	330	245	536	95% Approximate Gamma UCL	536	95% Approximate Gamma UCL
101-07-035AE	10	Arsenic	9	9	100	mg/kg	5.2	72.1	B	34.5	24.4	49.6	95% Student's-t UCL	49.6	95% Student's-t UCL
101-07-035AE	10	Copper	9	9	100	mg/kg	1,710	17,500	B	8,310	6,060	12,100	95% Student's-t UCL	12,100	95% Student's-t UCL
101-07-035AE	10	Lead	9	9	100	mg/kg	25.8	376	G	139	121	214	95% Student's-t UCL	214	95% Student's-t UCL
101-07-035AS	10	Arsenic	9	9	100	mg/kg	11.7	30	G	24.6	5.42	27.9	95% Student's-t UCL	27.9	95% Student's-t UCL
101-07-035AS	10	Copper	9	9	100	mg/kg	4,260	42,100	H	17,300	12,600	25,100	95% Student's-t UCL	25,100	95% Student's-t UCL
101-07-035AS	10	Lead	9	9	100	mg/kg	46.4	285	F	153	81.9	204	95% Student's-t UCL	204	95% Student's-t UCL
101-07-041	10	Arsenic	9	9	100	mg/kg	8.4	23.1	H	14.6	4.87	17.6	95% Student's-t UCL	17.6	95% Student's-t UCL
101-07-041	10	Copper	9	9	100	mg/kg	2,140	5,870	H	3,340	1,180	4,070	95% Student's-t UCL	4,070	95% Student's-t UCL
101-07-041	10	Lead	9	9	100	mg/kg	104	294	E	184	56.2	219	95% Student's-t UCL	219	95% Student's-t UCL
101-07-042	10	Arsenic	9	9	100	mg/kg	5.3	25	I	15.3	7.74	20.1	95% Student's-t UCL	20.1	95% Student's-t UCL
101-07-042	10	Copper	9	9	100	mg/kg	1,380	6,540	F	3,750	1,770	4,850	95% Student's-t UCL	4,850	95% Student's-t UCL
101-07-042	10	Lead	9	9	100	mg/kg	75.6	399	I	225	126	303	95% Student's-t UCL	303	95% Student's-t UCL
101-07-046	10	Arsenic	9	9	100	mg/kg	3.2	35.3	G	14.1	9.95	20.3	95% Student's-t UCL	20.3	95% Student's-t UCL
101-07-046	10	Copper	9	9	100	mg/kg	1,010	6,240	G	3,140	1,920	4,330	95% Student's-t UCL	4,330	95% Student's-t UCL
101-07-046	10	Lead	9	9	100	mg/kg	112	1,270	D	492	390	734	95% Student's-t UCL	734	95% Student's-t UCL
101-07-047	10	Arsenic	9	9	100	mg/kg	12.4	69.3	D	31.6	17.3	42.3	95% Student's-t UCL	42.3	95% Student's-t UCL
101-07-047	10	Copper	9	9	100	mg/kg	4,600	16,100	D	8,290	3,510	10,500	95% Student's-t UCL	10,500	95% Student's-t UCL
101-07-047	10	Lead	9	9	100	mg/kg	152	915	D	495	303	755	95% Approximate Gamma UCL	755	95% Approximate Gamma UCL
101-07-050A	10	Arsenic	9	9	100	mg/kg	7.3	22.1	A	12.7	5.75	16.3	95% Student's-t UCL	16.3	95% Student's-t UCL
101-07-050A	10	Copper	9	9	100	mg/kg	2,650	4,970	E	3,790	757	4,260	95% Student's-t UCL	4,260	95% Student's-t UCL

Table A-1
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Hayden, Residential Zones 1 to 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-07-050A	10	Lead	9	9	100	mg/kg	72.2	200	E	109	45.7	142	95% Approximate Gamma UCL	142	95% Approximate Gamma UCL
101-07-065	11	Arsenic	9	9	100	mg/kg	4.9	18.7	F	11.9	5.5	15.3	95% Student's-t UCL	15.3	95% Student's-t UCL
101-07-065	11	Copper	9	9	100	mg/kg	465	3,910	G	1,880	1,100	2,560	95% Student's-t UCL	2,560	95% Student's-t UCL
101-07-065	11	Lead	9	9	100	mg/kg	27.2	1,280	I	326	393	736	95% Approximate Gamma UCL	736	95% Approximate Gamma UCL
101-07-066	11	Arsenic	7	7	100	mg/kg	5.3	15.5	B	9.64	3.54	12.2	95% Student's-t UCL	12.2	95% Student's-t UCL
101-07-066	11	Copper	7	7	100	mg/kg	1,880	4,740	B	2,560	1,020	3,310	95% Student's-t UCL	3,310	95% Student's-t UCL
101-07-066	11	Lead	7	7	100	mg/kg	53.9	3,180	H	537	1,170	4,920	99% Chebyshev (Mean, Sd) UCL	3,180	Maximum Result
101-07-082	11	Arsenic	9	9	100	mg/kg	8.9	30.7	F	19.7	7.63	24.5	95% Student's-t UCL	24.5	95% Student's-t UCL
101-07-082	11	Copper	9	9	100	mg/kg	1,710	6,580	A	3,800	1,420	4,680	95% Student's-t UCL	4,680	95% Student's-t UCL
101-07-082	11	Lead	9	9	100	mg/kg	79.9	370	A	200	115	272	95% Student's-t UCL	272	95% Student's-t UCL
101-09-014	11	Arsenic	9	9	100	mg/kg	9	31.5	G	15.5	7.29	20	95% Student's-t UCL	20	95% Student's-t UCL
101-09-014	11	Copper	9	9	100	mg/kg	1,940	6,750	I	4,050	1,820	5,180	95% Student's-t UCL	5,180	95% Student's-t UCL
101-09-014	11	Lead	9	9	100	mg/kg	99.3	558	H	272	156	368	95% Student's-t UCL	368	95% Student's-t UCL
101-09-004	12	Arsenic	9	9	100	mg/kg	11	48.5	D	29.6	11.8	37	95% Student's-t UCL	37	95% Student's-t UCL
101-09-004	12	Copper	9	9	100	mg/kg	2,110	8,870	H	5,710	2,610	7,320	95% Student's-t UCL	7,320	95% Student's-t UCL
101-09-004	12	Lead	9	9	100	mg/kg	69.3	8,170	H	1,200	2,620	9,880	99% Chebyshev (Mean, Sd) UCL	8,170	Maximum Result
101-09-008	12	Arsenic	9	9	100	mg/kg	9.6	57.1	H	36.5	17.8	47.6	95% Student's-t UCL	47.6	95% Student's-t UCL
101-09-008	12	Copper	9	9	100	mg/kg	1,230	17,800	E	7,490	5,350	10,800	95% Student's-t UCL	10,800	95% Student's-t UCL
101-09-008	12	Lead	9	9	100	mg/kg	43.5	525	E	265	150	358	95% Student's-t UCL	358	95% Student's-t UCL
101-09-010	12	Arsenic	9	9	100	mg/kg	13.8	41.7	C	24.6	8.87	30.1	95% Student's-t UCL	30.1	95% Student's-t UCL
101-09-010	12	Copper	9	9	100	mg/kg	3,250	8,120	E	5,780	2,000	7,030	95% Student's-t UCL	7,030	95% Student's-t UCL
101-09-010	12	Lead	9	9	100	mg/kg	178	1,140	B	369	296	799	95% Chebyshev (Mean, Sd) UCL	799	95% Chebyshev (Mean, Sd) UCL
101-09-025A	12	Arsenic	9	9	100	mg/kg	7	33.7	H	14.6	7.68	19.9	95% Approximate Gamma UCL	19.9	95% Approximate Gamma UCL
101-09-025A	12	Copper	9	9	100	mg/kg	1,900	9,970	H	4,200	2,480	5,970	95% Approximate Gamma UCL	5,970	95% Approximate Gamma UCL
101-09-025A	12	Lead	9	9	100	mg/kg	26	281	E	180	76.4	227	95% Student's-t UCL	227	95% Student's-t UCL
101-09-027	12	Arsenic	9	9	100	mg/kg	8.5	27.3	G	16.7	6.69	20.8	95% Student's-t UCL	20.8	95% Student's-t UCL
101-09-027	12	Copper	9	9	100	mg/kg	1,380	6,840	F	3,470	1,910	4,650	95% Student's-t UCL	4,650	95% Student's-t UCL
101-09-027	12	Lead	9	9	100	mg/kg	188	1,190	H	403	310	616	95% Approximate Gamma UCL	616	95% Approximate Gamma UCL
101-09-032	12	Arsenic	9	9	100	mg/kg	13.3	40.8	C	27.8	8.48	33.1	95% Student's-t UCL	33.1	95% Student's-t UCL
101-09-032	12	Copper	9	9	100	mg/kg	2,320	9,940	B	6,920	2,540	8,490	95% Student's-t UCL	8,490	95% Student's-t UCL
101-09-032	12	Lead	9	9	100	mg/kg	209	591	H	396	138	481	95% Student's-t UCL	481	95% Student's-t UCL
101-09-033	12	Arsenic	9	9	100	mg/kg	23.1	89.1	A	39.9	21.8	53.4	95% Student's-t UCL	53.4	95% Student's-t UCL
101-09-033	12	Copper	9	9	100	mg/kg	2,340	17,500	A	7,570	4,350	10,300	95% Student's-t UCL	10,300	95% Student's-t UCL
101-09-033	12	Lead	9	9	100	mg/kg	211	1,610	A	580	475	972	95% Approximate Gamma UCL	972	95% Approximate Gamma UCL
101-09-059	13	Arsenic	9	9	100	mg/kg	3.8	19.7	C	10.5	5.28	13.8	95% Student's-t UCL	13.8	95% Student's-t UCL
101-09-059	13	Copper	9	9	100	mg/kg	364	9,390	C	3,930	2,570	5,520	95% Student's-t UCL	5,520	95% Student's-t UCL
101-09-059	13	Lead	9	9	100	mg/kg	21.9	1,350	F	303	413	727	95% Approximate Gamma UCL	727	95% Approximate Gamma UCL
101-09-062	13	Arsenic	9	9	100	mg/kg	4.6	31.8	G	18.7	9.08	24.4	95% Student's-t UCL	24.4	95% Student's-t UCL
101-09-062	13	Copper	9	9	100	mg/kg	1,410	5,460	G	3,830	1,230	4,590	95% Student's-t UCL	4,590	95% Student's-t UCL
101-09-062	13	Lead	9	9	100	mg/kg	122	1,070	H	539	280	712	95% Student's-t UCL	712	95% Student's-t UCL
101-09-064	13	Arsenic	9	9	100	mg/kg	9.6	74.7	H	30	20.4	42.7	95% Student's-t UCL	42.7	95% Student's-t UCL
101-09-064	13	Copper	9	9	100	mg/kg	3,930	18,500	H	7,770	4,600	11,100	95% Approximate Gamma UCL	11,100	95% Approximate Gamma UCL
101-09-064	13	Lead	9	9	100	mg/kg	126	434	F	232	124	412	95% Chebyshev (Mean, Sd) UCL	412	95% Chebyshev (Mean, Sd) UCL
101-09-067	13	Arsenic	9	9	100	mg/kg	20.7	44.8	F	32.3	7.67	37	95% Student's-t UCL	37	95% Student's-t UCL

Table A-1
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Hayden, Residential Zones 1 to 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-09-067	13	Copper	9	9	100	mg/kg	4,310	6,890	I	5,410	901	5,970	95% Student's-t UCL	5,970	95% Student's-t UCL
101-09-067	13	Lead	9	9	100	mg/kg	229	1,390	C	667	390	909	95% Student's-t UCL	909	95% Student's-t UCL
101-09-068	13	Arsenic	9	9	100	mg/kg	6.8	33.1	E	15.9	7.87	20.7	95% Student's-t UCL	20.7	95% Student's-t UCL
101-09-068	13	Copper	9	9	100	mg/kg	826	5,740	E	3,340	1,280	4,130	95% Student's-t UCL	4,130	95% Student's-t UCL
101-09-068	13	Lead	9	9	100	mg/kg	35.9	512	C	199	157	296	95% Student's-t UCL	296	95% Student's-t UCL
101-09-070	13	Arsenic	9	9	100	mg/kg	8.3	32.7	B	20.6	8.6	25.9	95% Student's-t UCL	25.9	95% Student's-t UCL
101-09-070	13	Copper	9	9	100	mg/kg	2,200	13,400	E	6,280	3,610	8,510	95% Student's-t UCL	8,510	95% Student's-t UCL
101-09-070	13	Lead	9	9	100	mg/kg	163	4,860	E	832	1,520	3,030	95% Chebyshev (Mean, Sd) UCL	3,030	95% Chebyshev (Mean, Sd) UCL
101-09-072	13	Arsenic	9	9	100	mg/kg	7.2	34.8	H	23.5	8.82	29	95% Student's-t UCL	29	95% Student's-t UCL
101-09-072	13	Copper	9	9	100	mg/kg	3,550	11,800	G	6,850	2,560	8,430	95% Student's-t UCL	8,430	95% Student's-t UCL
101-09-072	13	Lead	9	9	100	mg/kg	62.5	1,030	A	280	297	518	95% Approximate Gamma UCL	518	95% Approximate Gamma UCL
101-09-036	14	Arsenic	9	9	100	mg/kg	14.2	49.3	C	23.9	11.5	32.1	95% Approximate Gamma UCL	32.1	95% Approximate Gamma UCL
101-09-036	14	Copper	9	9	100	mg/kg	1,670	9,680	F	5,230	2,850	7,000	95% Student's-t UCL	7,000	95% Student's-t UCL
101-09-036	14	Lead	9	9	100	mg/kg	84.1	3,710	H	1,150	1,190	2,330	95% Approximate Gamma UCL	2,330	95% Approximate Gamma UCL
101-09-038	14	Arsenic	9	9	100	mg/kg	11.7	116	H	56.8	35.3	78.7	95% Student's-t UCL	78.7	95% Student's-t UCL
101-09-038	14	Copper	9	9	100	mg/kg	856	17,200	H	10,600	5,840	14,300	95% Student's-t UCL	14,300	95% Student's-t UCL
101-09-038	14	Lead	9	9	100	mg/kg	30.2	557	H	318	167	422	95% Student's-t UCL	422	95% Student's-t UCL
101-09-039	14	Arsenic	9	9	100	mg/kg	6	32.5	I	16.2	9.77	22.3	95% Student's-t UCL	22.3	95% Student's-t UCL
101-09-039	14	Copper	9	9	100	mg/kg	1,250	12,600	I	4,680	3,570	6,890	95% Student's-t UCL	6,890	95% Student's-t UCL
101-09-039	14	Lead	9	9	100	mg/kg	35.9	5,210	I	737	1,680	3,010	99% Chebyshev (MVUE) UCL	3,010	99% Chebyshev (MVUE) UCL
101-09-042	14	Arsenic	9	9	100	mg/kg	9.7	26	B	14.7	4.82	17.7	95% Student's-t UCL	17.7	95% Student's-t UCL
101-09-042	14	Copper	9	9	100	mg/kg	3,000	7,110	B	4,070	1,350	4,960	95% Approximate Gamma UCL	4,960	95% Approximate Gamma UCL
101-09-042	14	Lead	9	9	100	mg/kg	228	491	I	347	83.2	398	95% Student's-t UCL	398	95% Student's-t UCL
101-09-045	14	Arsenic	9	9	100	mg/kg	5	31.5	A	17.8	7.73	22.6	95% Student's-t UCL	22.6	95% Student's-t UCL
101-09-045	14	Copper	9	9	100	mg/kg	1,280	6,360	D	4,050	1,560	5,010	95% Student's-t UCL	5,010	95% Student's-t UCL
101-09-045	14	Lead	9	9	100	mg/kg	31.1	192	F	110	42.7	137	95% Student's-t UCL	137	95% Student's-t UCL
101-09-047	14	Arsenic	9	9	100	mg/kg	12.1	28.5	I	18.7	5.76	22.2	95% Student's-t UCL	22.2	95% Student's-t UCL
101-09-047	14	Copper	9	9	100	mg/kg	3,170	12,400	H	5,260	3,000	7,330	95% Approximate Gamma UCL	7,330	95% Approximate Gamma UCL
101-09-047	14	Lead	9	9	100	mg/kg	222	1,170	C	606	401	961	95% Approximate Gamma UCL	961	95% Approximate Gamma UCL
101-09-054	14	Arsenic	9	9	100	mg/kg	12.6	29.9	I	21.9	6.11	25.7	95% Student's-t UCL	25.7	95% Student's-t UCL
101-09-054	14	Copper	9	9	100	mg/kg	3,070	8,880	I	5,940	2,480	7,480	95% Student's-t UCL	7,480	95% Student's-t UCL
101-09-054	14	Lead	9	9	100	mg/kg	124	783	I	551	203	676	95% Student's-t UCL	676	95% Student's-t UCL
101-09-077	14	Arsenic	9	9	100	mg/kg	19.4	66.3	C	35.5	16.5	45.7	95% Student's-t UCL	45.7	95% Student's-t UCL
101-09-077	14	Copper	9	9	100	mg/kg	4,130	8,110	G	5,630	1,480	6,550	95% Student's-t UCL	6,550	95% Student's-t UCL
101-09-077	14	Lead	9	9	100	mg/kg	211	7,250	C	1,260	2,300	8,900	99% Chebyshev (Mean, Sd) UCL	7,250	Maximum Result
101-09-083	15	Arsenic	9	9	100	mg/kg	1.7	69.5	F	17.4	20.1	33.6	95% Approximate Gamma UCL	33.6	95% Approximate Gamma UCL
101-09-083	15	Copper	9	9	100	mg/kg	254	11,900	F	3,020	3,440	5,910	95% Approximate Gamma UCL	5,910	95% Approximate Gamma UCL
101-09-083	15	Lead	9	9	100	mg/kg	28.2	536	G	350	175	459	95% Student's-t UCL	459	95% Student's-t UCL
101-09-084	15	Arsenic	9	9	100	mg/kg	10.5	45.6	A	30.3	10.3	36.7	95% Student's-t UCL	36.7	95% Student's-t UCL
101-09-084	15	Copper	9	9	100	mg/kg	2,610	9,290	A	6,660	2,000	7,900	95% Student's-t UCL	7,900	95% Student's-t UCL
101-09-084	15	Lead	9	9	100	mg/kg	260	1,840	H	922	475	1,220	95% Student's-t UCL	1,220	95% Student's-t UCL
101-09-088	15	Arsenic	9	9	100	mg/kg	2.9	32.3	B	13.2	9.45	19.1	95% Student's-t UCL	19.1	95% Student's-t UCL
101-09-088	15	Copper	9	9	100	mg/kg	272	4,060	E	1,890	1,280	2,690	95% Student's-t UCL	2,690	95% Student's-t UCL
101-09-088	15	Lead	9	9	100	mg/kg	25.7	92,600	B	10,500	30,800	1,280,000	95% Hall's Bootstrap UCL	92,600	Maximum Result

Table A-1
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Hayden, Residential Zones 1 to 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-09-134	15	Arsenic	9	9	100	mg/kg	2.7	32.4	H	12.5	8.16	19.1	95% Approximate Gamma UCL	19.1	95% Approximate Gamma UCL
101-09-134	15	Copper	9	9	100	mg/kg	653	11,200	H	2,860	3,200	6,010	95% H-UCL	6,010	95% H-UCL
101-09-134	15	Lead	9	9	100	mg/kg	18.1	144	H	59.7	34.6	85.9	95% Approximate Gamma UCL	85.9	95% Approximate Gamma UCL
101-09-104	16	Arsenic	9	9	100	mg/kg	23.6	53.4	E	36.4	10.4	42.9	95% Student's-t UCL	42.9	95% Student's-t UCL
101-09-104	16	Copper	9	9	100	mg/kg	5,630	19,700	E	10,100	4,260	12,700	95% Student's-t UCL	12,700	95% Student's-t UCL
101-09-104	16	Lead	9	9	100	mg/kg	143	661	A	354	189	471	95% Student's-t UCL	471	95% Student's-t UCL
101-09-106	16	Arsenic	9	9	100	mg/kg	17.1	88.3	D	37.5	21.1	52.4	95% Approximate Gamma UCL	52.4	95% Approximate Gamma UCL
101-09-106	16	Copper	9	9	100	mg/kg	5,130	15,800	D	10,100	3,080	12,000	95% Student's-t UCL	12,000	95% Student's-t UCL
101-09-106	16	Lead	9	9	100	mg/kg	90.3	2,990	D	658	894	1,350	95% Approximate Gamma UCL	1,350	95% Approximate Gamma UCL
101-09-107	16	Arsenic	9	9	100	mg/kg	23	41.3	F	30.3	7.56	35.5	95% Approximate Gamma UCL	35.5	95% Approximate Gamma UCL
101-09-107	16	Copper	9	9	100	mg/kg	4,930	13,100	A	7,030	2,530	8,700	95% Approximate Gamma UCL	8,700	95% Approximate Gamma UCL
101-09-107	16	Lead	9	9	100	mg/kg	144	841	F	432	229	574	95% Student's-t UCL	574	95% Student's-t UCL
101-09-108	16	Arsenic	9	9	100	mg/kg	31.8	62.6	H	45.7	10.6	52.3	95% Student's-t UCL	52.3	95% Student's-t UCL
101-09-108	16	Copper	9	9	100	mg/kg	3,590	20,600	G	12,100	5,980	15,800	95% Student's-t UCL	15,800	95% Student's-t UCL
101-09-108	16	Lead	9	9	100	mg/kg	133	2,470	I	813	858	1,600	95% Approximate Gamma UCL	1,600	95% Approximate Gamma UCL
101-09-109	16	Arsenic	9	9	100	mg/kg	18.5	50.9	H	31.1	11.5	38.2	95% Student's-t UCL	38.2	95% Student's-t UCL
101-09-109	16	Copper	9	9	100	mg/kg	5,250	15,800	D	11,800	4,120	14,400	95% Student's-t UCL	14,400	95% Student's-t UCL
101-09-109	16	Lead	9	9	100	mg/kg	106	867	H	328	303	590	95% Approximate Gamma UCL	590	95% Approximate Gamma UCL
101-09-111B	16	Arsenic	9	9	100	mg/kg	19.1	79.9	F	47.4	21.1	60.5	95% Student's-t UCL	60.5	95% Student's-t UCL
101-09-111B	16	Copper	9	9	100	mg/kg	5,220	18,200	F	10,700	4,930	13,800	95% Student's-t UCL	13,800	95% Student's-t UCL
101-09-111B	16	Lead	9	9	100	mg/kg	90.9	687	D	255	178	385	95% Approximate Gamma UCL	385	95% Approximate Gamma UCL
101-09-137	16	Arsenic	9	9	100	mg/kg	13.7	41.1	H	25.7	8.25	30.8	95% Student's-t UCL	30.8	95% Student's-t UCL
101-09-137	16	Copper	9	9	100	mg/kg	750	8,140	I	3,950	2,610	5,570	95% Student's-t UCL	5,570	95% Student's-t UCL
101-09-137	16	Lead	9	9	100	mg/kg	30.9	158	I	78.4	43.4	105	95% Student's-t UCL	105	95% Student's-t UCL
101-09-140	16	Arsenic	9	9	100	mg/kg	7.1	294	D	68.5	87.7	221	95% H-UCL	221	95% H-UCL
101-09-140	16	Copper	9	9	100	mg/kg	1,850	76,600	D	17,100	23,200	39,700	95% Chebyshev (MVUE) UCL	39,700	95% Chebyshev (MVUE) UCL
101-09-140	16	Lead	9	9	100	mg/kg	30.4	1,370	D	322	412	779	95% Chebyshev (MVUE) UCL	779	95% Chebyshev (MVUE) UCL
101-09-115	17	Arsenic	9	9	100	mg/kg	9	43.2	H	27.2	10.3	33.6	95% Student's-t UCL	33.6	95% Student's-t UCL
101-09-115	17	Copper	9	9	100	mg/kg	2,310	9,010	H	6,110	2,140	7,430	95% Student's-t UCL	7,430	95% Student's-t UCL
101-09-115	17	Lead	9	9	100	mg/kg	57	355	H	215	94	273	95% Student's-t UCL	273	95% Student's-t UCL
101-09-120	17	Arsenic	9	9	100	mg/kg	15.5	51.9	D	32.3	13.4	40.6	95% Student's-t UCL	40.6	95% Student's-t UCL
101-09-120	17	Copper	9	9	100	mg/kg	1,700	9,980	F	6,180	2,890	7,980	95% Student's-t UCL	7,980	95% Student's-t UCL
101-09-120	17	Lead	9	9	100	mg/kg	59.2	319	F	173	92.6	231	95% Student's-t UCL	231	95% Student's-t UCL

Table A-2
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Winkelman, Residential Zones 18 to 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-12-008F	18	Arsenic	9	9	100	mg/kg	1.9	9	E	3.83	2.3	5.48	95% Approximate Gamma UCL	5.48	95% Approximate Gamma UCL
101-12-008F	18	Copper	9	9	100	mg/kg	190	1,110	E	486	273	655	95% Student's-t UCL	655	95% Student's-t UCL
101-12-008F	18	Lead	9	9	100	mg/kg	12.9	99.9	E	37.1	27.9	59.4	95% Approximate Gamma UCL	59.4	95% Approximate Gamma UCL
101-12-008J	18	Arsenic	9	9	100	mg/kg	4.1	28	G	14.5	8.97	20.1	95% Student's-t UCL	20.1	95% Student's-t UCL
101-12-008J	18	Copper	9	9	100	mg/kg	130	519	D	293	114	364	95% Student's-t UCL	364	95% Student's-t UCL
101-12-008J	18	Lead	9	9	100	mg/kg	29.2	392	B	127	125	248	95% Approximate Gamma UCL	248	95% Approximate Gamma UCL
101-12-008K	18	Arsenic	9	9	100	mg/kg	3.1	4.5	C	3.8	0.532	4.13	95% Student's-t UCL	4.13	95% Student's-t UCL
101-12-008K	18	Copper	9	9	100	mg/kg	172	825	C	443	250	598	95% Student's-t UCL	598	95% Student's-t UCL
101-12-008K	18	Lead	9	9	100	mg/kg	19.7	49.1	C	28.4	10.2	34.8	95% Student's-t UCL	34.8	95% Student's-t UCL
101-12-023A	18	Arsenic	9	9	100	mg/kg	3	6.2	F	4.47	0.907	5.03	95% Student's-t UCL	5.03	95% Student's-t UCL
101-12-023A	18	Copper	9	9	100	mg/kg	75.6	646	D	255	208	383	95% Student's-t UCL	383	95% Student's-t UCL
101-12-023A	18	Lead	9	9	100	mg/kg	15.5	667	A	141	208	341	95% Approximate Gamma UCL	341	95% Approximate Gamma UCL
101-12-288	18	Arsenic	9	9	100	mg/kg	2.9	5.9	B	4.2	0.896	4.76	95% Student's-t UCL	4.76	95% Student's-t UCL
101-12-288	18	Copper	9	9	100	mg/kg	78.3	417	D	269	112	338	95% Student's-t UCL	338	95% Student's-t UCL
101-12-288	18	Lead	9	9	100	mg/kg	14.3	433	G	78.4	134	273	95% Chebyshev (Mean, Sd) UCL	273	95% Chebyshev (Mean, Sd) UCL
101-12-071	19	Arsenic	9	9	100	mg/kg	4.2	165	B	45	62.7	112	95% Chebyshev (MVUE) UCL	112	95% Chebyshev (MVUE) UCL
101-12-071	19	Copper	9	9	100	mg/kg	73.9	1,190	B	506	301	692	95% Student's-t UCL	692	95% Student's-t UCL
101-12-071	19	Lead	9	9	100	mg/kg	14.4	274	B	106	80.1	179	95% Approximate Gamma UCL	179	95% Approximate Gamma UCL
101-12-073	19	Arsenic	9	9	100	mg/kg	1.4	11.1	A	5.9	3.42	8.02	95% Student's-t UCL	8.02	95% Student's-t UCL
101-12-073	19	Copper	9	9	100	mg/kg	191	677	H	454	150	547	95% Student's-t UCL	547	95% Student's-t UCL
101-12-073	19	Lead	9	9	100	mg/kg	39.8	185	B	102	42.1	128	95% Student's-t UCL	128	95% Student's-t UCL
101-12-075	19	Arsenic	9	9	100	mg/kg	1.1	5.6	B	3.09	1.54	4.05	95% Student's-t UCL	4.05	95% Student's-t UCL
101-12-075	19	Copper	9	9	100	mg/kg	181	796	B	470	213	603	95% Student's-t UCL	603	95% Student's-t UCL
101-12-075	19	Lead	9	9	100	mg/kg	17.5	211	B	77.3	61.6	128	95% Approximate Gamma UCL	128	95% Approximate Gamma UCL
101-12-101A	19	Arsenic	9	9	100	mg/kg	3.3	10	G	5.22	1.89	6.4	95% Student's-t UCL	6.4	95% Student's-t UCL
101-12-101A	19	Copper	9	9	100	mg/kg	265	521	D	353	81	404	95% Student's-t UCL	404	95% Student's-t UCL
101-12-101A	19	Lead	9	9	100	mg/kg	79.6	780	G	185	228	517	95% Chebyshev (Mean, Sd) UCL	517	95% Chebyshev (Mean, Sd) UCL
101-12-102	19	Arsenic	9	9	100	mg/kg	4.8	6.8	G	5.64	0.631	6.04	95% Student's-t UCL	6.04	95% Student's-t UCL
101-12-102	19	Copper	9	9	100	mg/kg	229	698	F	456	136	540	95% Student's-t UCL	540	95% Student's-t UCL
101-12-102	19	Lead	9	9	100	mg/kg	35.7	360	I	162	95.2	221	95% Student's-t UCL	221	95% Student's-t UCL
101-12-093	20	Arsenic	11	11	100	mg/kg	3.1	12.4	K	6	2.61	7.43	95% Student's-t UCL	7.43	95% Student's-t UCL
101-12-093	20	Copper	11	11	100	mg/kg	314	1,990	K	752	475	1,040	95% Approximate Gamma UCL	1,040	95% Approximate Gamma UCL
101-12-093	20	Lead	11	11	100	mg/kg	36.6	176	K	79.8	39	101	95% Student's-t UCL	101	95% Student's-t UCL
101-12-094A	20	Arsenic	11	11	100	mg/kg	1.9	15.5	K	5.45	3.91	7.89	95% Approximate Gamma UCL	7.89	95% Approximate Gamma UCL
101-12-094A	20	Copper	11	11	100	mg/kg	208	1,050	L	495	250	632	95% Student's-t UCL	632	95% Student's-t UCL
101-12-094A	20	Lead	11	11	100	mg/kg	21.1	116	F	74.6	31.5	91.8	95% Student's-t UCL	91.8	95% Student's-t UCL
101-12-108	20	Arsenic	9	9	100	mg/kg	3.1	7.8	I	5.2	1.39	6.06	95% Student's-t UCL	6.06	95% Student's-t UCL
101-12-108	20	Copper	9	9	100	mg/kg	199	734	C	436	189	553	95% Student's-t UCL	553	95% Student's-t UCL
101-12-108	20	Lead	9	9	100	mg/kg	19.7	205	C	85.6	62.1	124	95% Student's-t UCL	124	95% Student's-t UCL
101-12-130	21	Arsenic	11	11	100	mg/kg	2.4	6.8	F	4.76	1.19	5.41	95% Student's-t UCL	5.41	95% Student's-t UCL
101-12-130	21	Copper	11	11	100	mg/kg	322	930	F	659	233	787	95% Student's-t UCL	787	95% Student's-t UCL
101-12-130	21	Lead	11	11	100	mg/kg	31.4	156	C	81.5	41.9	104	95% Student's-t UCL	104	95% Student's-t UCL

Table A-2
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Winkelman, Residential Zones 18 to 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-12-142	21	Arsenic	11	11	100	mg/kg	2.7	34.1	K	11.1	8.45	16.6	95% Approximate Gamma UCL	16.6	95% Approximate Gamma UCL
101-12-142	21	Copper	11	11	100	mg/kg	148	1,970	B	1,090	558	1,390	95% Student's-t UCL	1,390	95% Student's-t UCL
101-12-142	21	Lead	11	11	100	mg/kg	58.9	577	B	293	171	387	95% Student's-t UCL	387	95% Student's-t UCL
101-12-149	21	Arsenic	11	11	100	mg/kg	3.9	82.7	K	15.1	23	45.3	95% Chebyshev (Mean, Sd) UCL	45.3	95% Chebyshev (Mean, Sd) UCL
101-12-149	21	Copper	11	11	100	mg/kg	383	9,190	K	1,730	2,590	5,130	95% Chebyshev (Mean, Sd) UCL	5,130	95% Chebyshev (Mean, Sd) UCL
101-12-149	21	Lead	11	11	100	mg/kg	35.9	2,330	E	327	673	2,350	99% Chebyshev (Mean, Sd) UCL	2,330	Maximum Result
101-12-150	21	Arsenic	11	11	100	mg/kg	3.2	55.9	L	19.4	19	34.7	95% Approximate Gamma UCL	34.7	95% Approximate Gamma UCL
101-12-150	21	Copper	11	11	100	mg/kg	632	6,790	E	3,230	2,160	4,410	95% Student's-t UCL	4,410	95% Student's-t UCL
101-12-150	21	Lead	11	11	100	mg/kg	59.5	1,160	L	343	357	804	95% Chebyshev (MVUE) UCL	804	95% Chebyshev (MVUE) UCL
101-12-136	22	Arsenic	9	9	100	mg/kg	2.5	6.8	B	4.17	1.3	4.97	95% Student's-t UCL	4.97	95% Student's-t UCL
101-12-136	22	Copper	9	9	100	mg/kg	178	620	I	304	134	396	95% Approximate Gamma UCL	396	95% Approximate Gamma UCL
101-12-136	22	Lead	9	9	100	mg/kg	17	100	E	51.3	21.9	64.8	95% Student's-t UCL	64.8	95% Student's-t UCL
101-12-147A	22	Arsenic	9	9	100	mg/kg	2.9	8.3	A	5.09	1.6	6.08	95% Student's-t UCL	6.08	95% Student's-t UCL
101-12-147A	22	Copper	9	9	100	mg/kg	141	930	A	501	210	631	95% Student's-t UCL	631	95% Student's-t UCL
101-12-147A	22	Lead	9	9	100	mg/kg	32	234	A	87.8	60.9	133	95% Approximate Gamma UCL	133	95% Approximate Gamma UCL
101-12-187	22	Arsenic	7	9	78	mg/kg	0.78	4.9	D	1.82	1.49	2.8	95% KM (t) UCL	2.8	95% KM (t) UCL
101-12-187	22	Copper	9	9	100	mg/kg	111	431	H	259	104	324	95% Student's-t UCL	324	95% Student's-t UCL
101-12-187	22	Lead	9	9	100	mg/kg	11.3	69.8	E	38.3	22.1	52	95% Student's-t UCL	52	95% Student's-t UCL
101-12-188B	22	Arsenic	9	9	100	mg/kg	0.96	4.8	D	3.71	1.14	4.41	95% Student's-t UCL	4.41	95% Student's-t UCL
101-12-188B	22	Copper	9	9	100	mg/kg	165	489	D	335	90.1	391	95% Student's-t UCL	391	95% Student's-t UCL
101-12-188B	22	Lead	9	9	100	mg/kg	20.2	53	C	35.3	11.3	42.3	95% Student's-t UCL	42.3	95% Student's-t UCL
101-12-193	23	Arsenic	9	9	100	mg/kg	4.1	7	A	5.43	0.927	6.01	95% Student's-t UCL	6.01	95% Student's-t UCL
101-12-193	23	Copper	9	9	100	mg/kg	176	1,070	E	484	289	663	95% Student's-t UCL	663	95% Student's-t UCL
101-12-193	23	Lead	9	9	100	mg/kg	54.9	3,330	D	699	1,030	1,730	95% Approximate Gamma UCL	1,730	95% Approximate Gamma UCL
101-12-234	23	Arsenic	9	9	100	mg/kg	2.9	9.1	G	5.06	2.32	6.73	95% Approximate Gamma UCL	6.73	95% Approximate Gamma UCL
101-12-234	23	Copper	9	9	100	mg/kg	94	324	G	226	80.4	276	95% Student's-t UCL	276	95% Student's-t UCL
101-12-234	23	Lead	9	9	100	mg/kg	25.1	430	G	137	136	265	95% Approximate Gamma UCL	265	95% Approximate Gamma UCL
101-12-236	23	Arsenic	9	9	100	mg/kg	1.2	7.3	D	4.32	1.75	5.41	95% Student's-t UCL	5.41	95% Student's-t UCL
101-12-236	23	Copper	9	9	100	mg/kg	81.3	1,050	D	454	306	643	95% Student's-t UCL	643	95% Student's-t UCL
101-12-236	23	Lead	9	9	100	mg/kg	9.4	176	A	82.2	63.9	122	95% Student's-t UCL	122	95% Student's-t UCL
101-10-019	24	Arsenic	9	9	100	mg/kg	3.1	4.7	H	4.14	0.505	4.46	95% Student's-t UCL	4.46	95% Student's-t UCL
101-10-019	24	Copper	9	9	100	mg/kg	326	490	H	384	52.4	417	95% Student's-t UCL	417	95% Student's-t UCL
101-10-019	24	Lead	9	9	100	mg/kg	15.4	37.2	H	24.3	6.87	28.6	95% Student's-t UCL	28.6	95% Student's-t UCL
101-10-023	24	Arsenic	9	9	100	mg/kg	3.8	6.9	I	5.41	1.04	6.06	95% Student's-t UCL	6.06	95% Student's-t UCL
101-10-023	24	Copper	9	9	100	mg/kg	313	657	H	463	117	536	95% Student's-t UCL	536	95% Student's-t UCL
101-10-023	24	Lead	9	9	100	mg/kg	27.8	67.9	A	43.7	12.1	51.3	95% Student's-t UCL	51.3	95% Student's-t UCL
101-12-241	24	Arsenic	9	9	100	mg/kg	2.9	6.3	I	4.2	1.02	4.83	95% Student's-t UCL	4.83	95% Student's-t UCL
101-12-241	24	Copper	9	9	100	mg/kg	144	491	E	295	127	374	95% Student's-t UCL	374	95% Student's-t UCL
101-12-241	24	Lead	9	9	100	mg/kg	18.1	126	I	37.5	34.2	60.3	95% Approximate Gamma UCL	60.3	95% Approximate Gamma UCL
101-12-154A	25	Arsenic	9	9	100	mg/kg	2.7	6.3	G	3.89	1.28	4.68	95% Student's-t UCL	4.68	95% Student's-t UCL
101-12-154A	25	Copper	9	9	100	mg/kg	293	1,070	G	564	290	780	95% Approximate Gamma UCL	780	95% Approximate Gamma UCL
101-12-154A	25	Lead	9	9	100	mg/kg	53.7	167	A	94	32.7	114	95% Student's-t UCL	114	95% Student's-t UCL

Table A-2
Summary Statistics for Surface Soil - CLP Data Only (As, Pb, Cu); Winkelman, Residential Zones 18 to 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Parcel	Zone	Parameter	Number of Detects	Number of Analyses	Percent Detects	Units	Minimum Detected Value	Maximum Detected Value	Location of Maximum Detected Concentration	Arithmetic Mean Value	Standard Deviation	Exposure Point Concentration	EPC Basis	Exposure Point Concentration (may be Max)	EPC Basis (may be Max)
101-12-155	25	Arsenic	9	9	100	mg/kg	0.63	7.1	A	2.99	1.99	4.22	95% Student's-t UCL	4.22	95% Student's-t UCL
101-12-155	25	Copper	9	9	100	mg/kg	196	908	C	564	288	743	95% Student's-t UCL	743	95% Student's-t UCL
101-12-155	25	Lead	9	9	100	mg/kg	35.5	1,510	A	226	482	1,820	99% Chebyshev (Mean, Sd) UCL	1,510	Maximum Result
101-12-204	25	Arsenic	9	9	100	mg/kg	3.8	7.4	C	5.7	1.13	6.4	95% Student's-t UCL	6.4	95% Student's-t UCL
101-12-204	25	Copper	9	9	100	mg/kg	207	1,110	C	530	293	712	95% Student's-t UCL	712	95% Student's-t UCL
101-12-204	25	Lead	9	9	100	mg/kg	13.9	110	C	55.8	31.1	75.1	95% Student's-t UCL	75.1	95% Student's-t UCL
101-12-267	25	Arsenic	9	9	100	mg/kg	3.3	9	I	5.71	1.72	6.78	95% Student's-t UCL	6.78	95% Student's-t UCL
101-12-267	25	Copper	9	9	100	mg/kg	102	489	C	290	123	367	95% Student's-t UCL	367	95% Student's-t UCL
101-12-267	25	Lead	9	9	100	mg/kg	37.5	216	B	77.7	61.3	167	95% Chebyshev (Mean, Sd) UCL	167	95% Chebyshev (Mean, Sd) UCL

Risk Calculations

Hayden Residential Properties

Table A-3
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-185C
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 1, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	9.02E+00	3.39E-06	1.50E+00	5.08E-06	5.07E-07	1.50E+00	7.61E-07	6.44E-10	1.51E+01	9.69E-09	5.85E-06
Copper	1.83E+03	8.59E-04	NA		3.43E-05	NA		1.31E-07	NA		
Child Resident											
Arsenic	9.02E+00	7.91E-06	1.50E+00	1.19E-05	8.30E-07	1.50E+00	1.25E-06	3.76E-10	1.51E+01	5.65E-09	1.31E-05
Copper	1.83E+03	2.01E-03	NA		5.62E-05	NA		7.62E-08	NA		
Total Adult Resident				5.1E-06			7.6E-07			9.7E-09	5.9E-06
Total Child Resident				1.2E-05			1.2E-06			5.7E-09	1.3E-05
Total Adult/Child Resident		(89.3% Contribution)		1.7E-05	(10.6% Contribution)		2.0E-06	(0.1% Contribution)		1.5E-08	1.9E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-4
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-185C
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 1, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	9.02E+00	9.88E-06	3.00E-04	3.29E-02	1.48E-06	3.00E-04	4.93E-03	1.88E-09	NA		3.79E-02
Copper	1.83E+03	2.51E-03	4.00E-02	6.27E-02	1.00E-04	4.00E-02	2.50E-03	3.81E-07	NA		6.52E-02
Child Resident											
Arsenic	9.02E+00	9.23E-05	3.00E-04	3.08E-01	9.69E-06	3.00E-04	3.23E-02	4.38E-09	NA		3.40E-01
Copper	1.83E+03	2.34E-02	4.00E-02	5.85E-01	6.55E-04	4.00E-02	1.64E-02	8.89E-07	NA		6.01E-01
Total Adult Resident				9.6E-02			7.4E-03			0.0E+00	0.10
Total Child Resident		(94.8% Contribution)		8.9E-01	(5.2% Contribution)		4.9E-02	(0% Contribution)		0.0E+00	0.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-5
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-193A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 1, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.44E+01	5.41E-06	1.50E+00	8.12E-06	8.10E-07	1.50E+00	1.21E-06	1.03E-09	1.51E+01	1.55E-08	9.35E-06
Copper	2.09E+03	9.82E-04	NA		3.92E-05	NA		1.49E-07	NA		
Child Resident											
Arsenic	1.44E+01	1.26E-05	1.50E+00	1.89E-05	1.33E-06	1.50E+00	1.99E-06	6.00E-10	1.51E+01	9.02E-09	2.09E-05
Copper	2.09E+03	2.29E-03	NA		6.41E-05	NA		8.70E-08	NA		
Total Adult Resident				8.1E-06			1.2E-06			1.5E-08	9.3E-06
Total Child Resident				1.9E-05			2.0E-06			9.0E-09	2.1E-05
Total Adult/Child Resident		(89.3% Contribution)		2.7E-05	(10.6% Contribution)		3.2E-06	(0.1% Contribution)		2.4E-08	3.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-6
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-193A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 1, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.44E+01	1.58E-05	3.00E-04	5.26E-02	2.36E-06	3.00E-04	7.87E-03	3.00E-09	NA		6.0E-02
Copper	2.09E+03	2.86E-03	4.00E-02	7.16E-02	1.14E-04	4.00E-02	2.86E-03	4.35E-07	NA		7.4E-02
Child Resident											
Arsenic	1.44E+01	1.47E-04	3.00E-04	4.91E-01	1.55E-05	3.00E-04	5.16E-02	7.00E-09	NA		5.4E-01
Copper	2.09E+03	2.67E-02	4.00E-02	6.68E-01	7.48E-04	4.00E-02	1.87E-02	1.02E-06	NA		6.9E-01
Total Adult Resident				1.2E-01			1.1E-02			0.0E+00	0.13
Total Child Resident			(94.3% Contribution)	1.2E+00		(5.7% Contribution)	7.0E-02		(0% Contribution)	0.0E+00	1.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-7
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-216
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 1, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.07E+01	7.78E-06	1.50E+00	1.17E-05	1.16E-06	1.50E+00	1.75E-06	1.48E-09	1.51E+01	2.22E-08	1.34E-05
Copper	2.23E+03	1.05E-03	NA		4.18E-05	NA		1.59E-07	NA		
Child Resident											
Arsenic	2.07E+01	1.81E-05	1.50E+00	2.72E-05	1.91E-06	1.50E+00	2.86E-06	8.62E-10	1.51E+01	1.30E-08	3.01E-05
Copper	2.23E+03	2.44E-03	NA		6.84E-05	NA		9.29E-08	NA		
Total Adult Resident				1.2E-05			1.7E-06			2.2E-08	1.3E-05
Total Child Resident				2.7E-05			2.9E-06			1.3E-08	3.0E-05
Total Adult/Child Resident		(89.3% Contribution)		3.9E-05	(10.6% Contribution)		4.6E-06	(0.1% Contribution)		3.5E-08	4.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-8
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 1 - Property 101-07-216
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 1, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.07E+01	2.27E-05	3.00E-04	7.56E-02	3.39E-06	3.00E-04	1.13E-02	4.31E-09	NA		8.7E-02
Copper	2.23E+03	3.05E-03	4.00E-02	7.64E-02	1.22E-04	4.00E-02	3.05E-03	4.64E-07	NA		7.9E-02
Child Resident											
Arsenic	2.07E+01	2.12E-04	3.00E-04	7.06E-01	2.22E-05	3.00E-04	7.41E-02	1.01E-08	NA		7.8E-01
Copper	2.23E+03	2.85E-02	4.00E-02	7.13E-01	7.98E-04	4.00E-02	2.00E-02	1.08E-06	NA		7.3E-01
Total Adult Resident				1.5E-01			1.4E-02			0.0E+00	0.17
Total Child Resident			(93.8% Contribution)	1.4E+00		(6.2% Contribution)	9.4E-02		(0% Contribution)	0.0E+00	1.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-9
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 1
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-185C	**Adult Resident**	Arsenic	9.02E+00	5.08E-06	7.61E-07	9.69E-09	5.85E-06	3.29E-02	4.93E-03		3.79E-02
		Copper	1.83E+03					6.27E-02	2.50E-03		6.52E-02
		Total					5.9E-06				0.1
	Child Resident	Arsenic	9.02E+00	1.19E-05	1.25E-06	5.65E-09	1.31E-05	3.08E-01	3.23E-02		3.40E-01
		Copper	1.83E+03					5.85E-01	1.64E-02		6.01E-01
		Total					1.3E-05				0.9
	Adult/Child Resident	Arsenic	9.02E+00	1.69E-05	2.01E-06	1.53E-08	1.90E-05				
		Copper	1.83E+03								
		Total					1.9E-05				NA
101-07-193A	**Adult Resident**	Arsenic	1.44E+01	8.12E-06	1.21E-06	1.55E-08	9.35E-06	5.26E-02	7.87E-03		6.05E-02
		Copper	2.09E+03					7.16E-02	2.86E-03		7.44E-02
		Total					9.3E-06				0.1
	Child Resident	Arsenic	1.44E+01	1.89E-05	1.99E-06	9.02E-09	2.09E-05	4.91E-01	5.16E-02		5.43E-01
		Copper	2.09E+03					6.68E-01	1.87E-02		6.87E-01
		Total					2.1E-05				1.2
	Adult/Child Resident	Arsenic	1.44E+01	2.71E-05	3.20E-06	2.45E-08	3.03E-05				
		Copper	2.09E+03								
		Total					3.0E-05				NA
101-07-216	**Adult Resident**	Arsenic	2.07E+01	1.17E-05	1.75E-06	2.22E-08	1.34E-05	7.56E-02	1.13E-02		8.69E-02
		Copper	2.23E+03					7.64E-02	3.05E-03		7.94E-02
		Total					1.3E-05				0.2
	Child Resident	Arsenic	2.07E+01	2.72E-05	2.86E-06	1.30E-08	3.01E-05	7.06E-01	7.41E-02		7.80E-01
		Copper	2.23E+03					7.13E-01	2.00E-02		7.33E-01
		Total					3.0E-05				1.5
	Adult/Child Resident	Arsenic	2.07E+01	3.89E-05	4.60E-06	3.52E-08	4.35E-05				
		Copper	2.23E+03								
		Total					4.4E-05				NA

Notes:
NA = Not applicable

Table A-10
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 1
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-185C	1.9E-05	0.9
101-07-193A	3.0E-05	1.2
101-07-216	4.4E-05	1.5

Table A-11
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-176
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.32E+02	4.96E-05	1.50E+00	7.44E-05	7.42E-06	1.50E+00	1.11E-05	9.42E-09	1.51E+01	1.42E-07	8.57E-05
Copper	3.41E+03	1.60E-03	NA		6.39E-05	NA		2.43E-07	NA		
Child Resident											
Arsenic	1.32E+02	1.16E-04	1.50E+00	1.74E-04	1.22E-05	1.50E+00	1.82E-05	5.50E-09	1.51E+01	8.27E-08	1.92E-04
Copper	3.41E+03	3.74E-03	NA		1.05E-04	NA		1.42E-07	NA		
Total Adult Resident				7.4E-05			1.1E-05			1.4E-07	8.6E-05
Total Child Resident				1.7E-04			1.8E-05			8.3E-08	1.9E-04
Total Adult/Child Resident		(89.3% Contribution)		2.5E-04	(10.6% Contribution)		2.9E-05	(0.1% Contribution)		2.2E-07	2.8E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-12
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-176
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.32E+02	1.45E-04	3.00E-04	4.82E-01	2.16E-05	3.00E-04	7.21E-02	2.75E-08	NA		5.54E-01
Copper	3.41E+03	4.67E-03	4.00E-02	1.17E-01	1.86E-04	4.00E-02	4.66E-03	7.10E-07	NA		1.21E-01
Child Resident											
Arsenic	1.32E+02	1.35E-03	3.00E-04	4.50E+00	1.42E-04	3.00E-04	4.73E-01	6.41E-08	NA		4.97E+00
Copper	3.41E+03	4.36E-02	4.00E-02	1.09E+00	1.22E-03	4.00E-02	3.05E-02	1.66E-06	NA		1.12E+00
Total Adult Resident				6.0E-01			7.7E-02			0.0E+00	0.68
Total Child Resident			(91.7% Contribution)	5.6E+00		(8.3% Contribution)	5.0E-01		(0% Contribution)	0.0E+00	6.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-13
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-202
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.08E+01	4.06E-06	1.50E+00	6.09E-06	6.07E-07	1.50E+00	9.11E-07	7.71E-10	1.51E+01	1.16E-08	7.01E-06
Copper	1.87E+03	8.78E-04	NA		3.50E-05	NA		1.33E-07	NA		
Child Resident											
Arsenic	1.08E+01	9.47E-06	1.50E+00	1.42E-05	9.94E-07	1.50E+00	1.49E-06	4.50E-10	1.51E+01	6.77E-09	1.57E-05
Copper	1.87E+03	2.05E-03	NA		5.74E-05	NA		7.79E-08	NA		
Total Adult Resident				6.1E-06			9.1E-07			1.2E-08	7.0E-06
Total Child Resident				1.4E-05			1.5E-06			6.8E-09	1.6E-05
Total Adult/Child Resident		(89.3% Contribution)		2.0E-05	(10.6% Contribution)		2.4E-06	(0.1% Contribution)		1.8E-08	2.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-14
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-202
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.08E+01	1.18E-05	3.00E-04	3.95E-02	1.77E-06	3.00E-04	5.90E-03	2.25E-09	NA		4.54E-02
Copper	1.87E+03	2.56E-03	4.00E-02	6.40E-02	1.02E-04	4.00E-02	2.56E-03	3.89E-07	NA		6.66E-02
Child Resident											
Arsenic	1.08E+01	1.10E-04	3.00E-04	3.68E-01	1.16E-05	3.00E-04	3.87E-02	5.25E-09	NA		4.07E-01
Copper	1.87E+03	2.39E-02	4.00E-02	5.98E-01	6.69E-04	4.00E-02	1.67E-02	9.08E-07	NA		6.14E-01
Total Adult Resident				1.0E-01			8.5E-03			0.0E+00	0.11
Total Child Resident		(94.6% Contribution)		9.7E-01	(5.4% Contribution)		5.5E-02	(0% Contribution)		0.0E+00	1.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-15
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-242
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.69E+01	6.35E-06	1.50E+00	9.52E-06	9.50E-07	1.50E+00	1.43E-06	1.21E-09	1.51E+01	1.82E-08	1.10E-05
Copper	4.51E+03	2.12E-03	NA		8.45E-05	NA		3.22E-07	NA		
Child Resident											
Arsenic	1.69E+01	1.48E-05	1.50E+00	2.22E-05	1.56E-06	1.50E+00	2.33E-06	7.04E-10	1.51E+01	1.06E-08	2.46E-05
Copper	4.51E+03	4.94E-03	NA		1.38E-04	NA		1.88E-07	NA		
Total Adult Resident				9.5E-06			1.4E-06			1.8E-08	1.1E-05
Total Child Resident				2.2E-05			2.3E-06			1.1E-08	2.5E-05
Total Adult/Child Resident		(89.3% Contribution)		3.2E-05	(10.6% Contribution)		3.8E-06	(0.1% Contribution)		2.9E-08	3.6E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-16
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-242
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.69E+01	1.85E-05	3.00E-04	6.17E-02	2.77E-06	3.00E-04	9.24E-03	3.52E-09	NA		7.10E-02
Copper	4.51E+03	6.18E-03	4.00E-02	1.54E-01	2.47E-04	4.00E-02	6.16E-03	9.39E-07	NA		1.61E-01
Child Resident											
Arsenic	1.69E+01	1.73E-04	3.00E-04	5.76E-01	1.82E-05	3.00E-04	6.05E-02	8.21E-09	NA		6.37E-01
Copper	4.51E+03	5.77E-02	4.00E-02	1.44E+00	1.61E-03	4.00E-02	4.04E-02	2.19E-06	NA		1.48E+00
Total Adult Resident				2.2E-01			1.5E-02			0.0E+00	0.23
Total Child Resident		(95.2% Contribution)		2.0E+00	(4.8% Contribution)		1.0E-01	(0% Contribution)		0.0E+00	2.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-17
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-244
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.13E+01	4.25E-06	1.50E+00	6.37E-06	6.35E-07	1.50E+00	9.53E-07	8.07E-10	1.51E+01	1.21E-08	7.33E-06
Copper	2.92E+03	1.37E-03	NA		5.47E-05	NA		2.08E-07	NA		
Child Resident											
Arsenic	1.13E+01	9.91E-06	1.50E+00	1.49E-05	1.04E-06	1.50E+00	1.56E-06	4.71E-10	1.51E+01	7.08E-09	1.64E-05
Copper	2.92E+03	3.20E-03	NA		8.96E-05	NA		1.22E-07	NA		
Total Adult Resident				6.4E-06			9.5E-07			1.2E-08	7.3E-06
Total Child Resident				1.5E-05			1.6E-06			7.1E-09	1.6E-05
Total Adult/Child Resident		(89.3% Contribution)		2.1E-05	(10.6% Contribution)		2.5E-06	(0.1% Contribution)		1.9E-08	2.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-18
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-244
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.13E+01	1.24E-05	3.00E-04	4.13E-02	1.85E-06	3.00E-04	6.18E-03	2.35E-09	NA		4.75E-02
Copper	2.92E+03	4.00E-03	4.00E-02	1.00E-01	1.60E-04	4.00E-02	3.99E-03	6.08E-07	NA		1.04E-01
Child Resident											
Arsenic	1.13E+01	1.16E-04	3.00E-04	3.85E-01	1.21E-05	3.00E-04	4.05E-02	5.49E-09	NA		4.26E-01
Copper	2.92E+03	3.73E-02	4.00E-02	9.33E-01	1.05E-03	4.00E-02	2.61E-02	1.42E-06	NA		9.59E-01
Total Adult Resident				1.4E-01			1.0E-02			0.0E+00	0.15
Total Child Resident			(95.2% Contribution)	1.3E+00		(4.8% Contribution)	6.7E-02		(0% Contribution)	0.0E+00	1.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-19
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-247
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.02E+01	3.83E-06	1.50E+00	5.75E-06	5.73E-07	1.50E+00	8.60E-07	7.28E-10	1.51E+01	1.10E-08	6.62E-06
Copper	2.55E+03	1.20E-03	NA		4.78E-05	NA		1.82E-07	NA		
Child Resident											
Arsenic	1.02E+01	8.94E-06	1.50E+00	1.34E-05	9.39E-07	1.50E+00	1.41E-06	4.25E-10	1.51E+01	6.39E-09	1.48E-05
Copper	2.55E+03	2.79E-03	NA		7.82E-05	NA		1.06E-07	NA		
Total Adult Resident				5.7E-06			8.6E-07			1.1E-08	6.6E-06
Total Child Resident				1.3E-05			1.4E-06			6.4E-09	1.5E-05
Total Adult/Child Resident		(89.3% Contribution)		1.9E-05	(10.6% Contribution)		2.3E-06	(0.1% Contribution)		1.7E-08	2.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-20
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 2 - Property 101-07-247
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 2, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.02E+01	1.12E-05	3.00E-04	3.73E-02	1.67E-06	3.00E-04	5.58E-03	2.12E-09	NA		4.28E-02
Copper	2.55E+03	3.49E-03	4.00E-02	8.73E-02	1.39E-04	4.00E-02	3.48E-03	5.31E-07	NA		9.08E-02
Child Resident											
Arsenic	1.02E+01	1.04E-04	3.00E-04	3.48E-01	1.10E-05	3.00E-04	3.65E-02	4.95E-09	NA		3.84E-01
Copper	2.55E+03	3.26E-02	4.00E-02	8.15E-01	9.13E-04	4.00E-02	2.28E-02	1.24E-06	NA		8.38E-01
Total Adult Resident				1.2E-01			9.1E-03			0.0E+00	0.13
Total Child Resident		(95.1% Contribution)		1.2E+00	(4.9% Contribution)		5.9E-02	(0% Contribution)		0.0E+00	1.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-21
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 2
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-176	**Adult Resident**	Arsenic	1.32E+02	7.44E-05	1.11E-05	1.42E-07	8.57E-05	4.82E-01	7.21E-02		5.54E-01
		Copper	3.41E+03					1.17E-01	4.66E-03		1.21E-01
		Total					8.6E-05				0.7
	Child Resident	Arsenic	1.32E+02	1.74E-04	1.82E-05	8.27E-08	1.92E-04	4.50E+00	4.73E-01		4.97E+00
		Copper	3.41E+03					1.09E+00	3.05E-02		1.12E+00
		Total					1.9E-04				6.1
	Adult/Child Resident	Arsenic	1.32E+02	2.48E-04	2.94E-05	2.25E-07	2.78E-04				
		Copper	3.41E+03								
		Total					2.8E-04				NA
101-07-202	**Adult Resident**	Arsenic	1.08E+01	6.09E-06	9.11E-07	1.16E-08	7.01E-06	3.95E-02	5.90E-03		4.54E-02
		Copper	1.87E+03					6.40E-02	2.56E-03		6.66E-02
		Total					7.0E-06				0.1
	Child Resident	Arsenic	1.08E+01	1.42E-05	1.49E-06	6.77E-09	1.57E-05	3.68E-01	3.87E-02		4.07E-01
		Copper	1.87E+03					5.98E-01	1.67E-02		6.14E-01
		Total					1.6E-05				1.0
	Adult/Child Resident	Arsenic	1.08E+01	2.03E-05	2.40E-06	1.84E-08	2.27E-05				
		Copper	1.87E+03								
		Total					2.3E-05				NA
101-07-242	**Adult Resident**	Arsenic	1.69E+01	9.52E-06	1.43E-06	1.82E-08	1.10E-05	6.17E-02	9.24E-03		7.10E-02
		Copper	4.51E+03					1.54E-01	6.16E-03		1.61E-01
		Total					1.1E-05				0.2
	Child Resident	Arsenic	1.69E+01	2.22E-05	2.33E-06	1.06E-08	2.46E-05	5.76E-01	6.05E-02		6.37E-01
		Copper	4.51E+03					1.44E+00	4.04E-02		1.48E+00
		Total					2.5E-05				2.1
	Adult/Child Resident	Arsenic	1.32E+02	3.17E-05	3.76E-06	2.87E-08	3.55E-05				
		Copper	3.41E+03								
		Total					3.6E-05				NA

Table A-21
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 2
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-244	**Adult Resident**	Arsenic	1.13E+01	6.37E-06	9.53E-07	1.21E-08	7.33E-06	4.13E-02	6.18E-03		4.75E-02
		Copper	2.92E+03					1.00E-01	3.99E-03		1.04E-01
		Total					7.3E-06				0.2
	Child Resident	Arsenic	1.13E+01	1.49E-05	1.56E-06	7.08E-09	1.64E-05	3.85E-01	4.05E-02		4.26E-01
		Copper	2.92E+03					9.33E-01	2.61E-02		9.59E-01
		Total					1.6E-05				1.4
	Adult/Child Resident	Arsenic	1.13E+01	2.12E-05	2.51E-06	1.92E-08	2.38E-05				
		Copper	2.92E+03								
		Total					2.4E-05				NA
101-07-247	**Adult Resident**	Arsenic	1.02E+01	5.75E-06	8.60E-07	1.10E-08	6.62E-06	3.73E-02	5.58E-03		4.28E-02
		Copper	2.55E+03					8.73E-02	3.48E-03		9.08E-02
		Total					6.6E-06				0.1
	Child Resident	Arsenic	1.02E+01	1.34E-05	1.41E-06	6.39E-09	1.48E-05	3.48E-01	3.65E-02		3.84E-01
		Copper	2.55E+03					8.15E-01	2.28E-02		8.38E-01
		Total					1.5E-05				1.2
	Adult/Child Resident	Arsenic	1.02E+01	1.92E-05	2.27E-06	1.73E-08	2.14E-05				
		Copper	2.55E+03								
		Total					2.1E-05				NA

Notes:
NA = Not applicable

Table A-22
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 2
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-176	2.8E-04	6.1
101-07-202	2.3E-05	1.0
101-07-242	3.6E-05	2.1
101-07-244	2.4E-05	1.4
101-07-247	2.1E-05	1.2

Table A-23
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-219
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 3, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.00E+01	7.51E-06	1.50E+00	1.13E-05	1.12E-06	1.50E+00	1.69E-06	1.43E-09	1.51E+01	2.15E-08	1.30E-05
Copper	4.00E+03	1.88E-03	NA		7.50E-05	NA		2.86E-07	NA		
Child Resident											
Arsenic	2.00E+01	1.75E-05	1.50E+00	2.63E-05	1.84E-06	1.50E+00	2.76E-06	8.33E-10	1.51E+01	1.25E-08	2.91E-05
Copper	4.00E+03	4.38E-03	NA		1.23E-04	NA		1.67E-07	NA		
Total Adult Resident				1.1E-05			1.7E-06			2.1E-08	1.3E-05
Total Child Resident				2.6E-05			2.8E-06			1.3E-08	2.9E-05
Total Adult/Child Resident		(89.3% Contribution)		3.8E-05	(10.6% Contribution)		4.4E-06	(0.1% Contribution)		3.4E-08	4.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-24
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-219
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 3, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.00E+01	2.19E-05	3.00E-04	7.31E-02	3.28E-06	3.00E-04	1.09E-02	4.16E-09	NA		8.40E-02
Copper	4.00E+03	5.48E-03	4.00E-02	1.37E-01	2.19E-04	4.00E-02	5.47E-03	8.33E-07	NA		1.42E-01
Child Resident											
Arsenic	2.00E+01	2.05E-04	3.00E-04	6.82E-01	2.15E-05	3.00E-04	7.16E-02	9.72E-09	NA		7.53E-01
Copper	4.00E+03	5.11E-02	4.00E-02	1.28E+00	1.43E-03	4.00E-02	3.58E-02	1.94E-06	NA		1.31E+00
Total Adult Resident				2.1E-01			1.6E-02			0.0E+00	0.23
Total Child Resident		(94.8% Contribution)		2.0E+00	(5.2% Contribution)		1.1E-01	(0% Contribution)		0.0E+00	2.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-25
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-234
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 3, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.02E+01	3.83E-06	1.50E+00	5.75E-06	5.73E-07	1.50E+00	8.60E-07	7.28E-10	1.51E+01	1.10E-08	6.62E-06
Copper	2.79E+03	1.31E-03	NA		5.23E-05	NA		1.99E-07	NA		
Child Resident											
Arsenic	1.02E+01	8.94E-06	1.50E+00	1.34E-05	9.39E-07	1.50E+00	1.41E-06	4.25E-10	1.51E+01	6.39E-09	1.48E-05
Copper	2.79E+03	3.06E-03	NA		8.56E-05	NA		1.16E-07	NA		
Total Adult Resident				5.7E-06			8.6E-07			1.1E-08	6.6E-06
Total Child Resident				1.3E-05			1.4E-06			6.4E-09	1.5E-05
Total Adult/Child Resident		(89.3% Contribution)		1.9E-05	(10.6% Contribution)		2.3E-06	(0.1% Contribution)		1.7E-08	2.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-26
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-234
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 3, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.02E+01	1.12E-05	3.00E-04	3.73E-02	1.67E-06	3.00E-04	5.58E-03	2.12E-09	NA		4.3E-02
Copper	2.79E+03	3.82E-03	4.00E-02	9.55E-02	1.52E-04	4.00E-02	3.81E-03	5.81E-07	NA		9.9E-02
Child Resident											
Arsenic	1.02E+01	1.04E-04	3.00E-04	3.48E-01	1.10E-05	3.00E-04	3.65E-02	4.95E-09	NA		3.8E-01
Copper	2.79E+03	3.57E-02	4.00E-02	8.92E-01	9.99E-04	4.00E-02	2.50E-02	1.36E-06	NA		9.2E-01
Total Adult Resident				1.3E-01			9.4E-03			0.0E+00	0.14
Total Child Resident			(95.3% Contribution)	1.2E+00		(4.7% Contribution)	6.1E-02		(0% Contribution)	0.0E+00	1.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-27
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-236
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 3, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.84E+01	1.07E-05	1.50E+00	1.60E-05	1.60E-06	1.50E+00	2.39E-06	2.03E-09	1.51E+01	3.05E-08	1.84E-05
Copper	5.29E+03	2.48E-03	NA		9.91E-05	NA		3.78E-07	NA		
Child Resident											
Arsenic	2.84E+01	2.49E-05	1.50E+00	3.73E-05	2.61E-06	1.50E+00	3.92E-06	1.18E-09	1.51E+01	1.78E-08	4.13E-05
Copper	5.29E+03	5.80E-03	NA		1.62E-04	NA		2.20E-07	NA		
Total Adult Resident				1.6E-05			2.4E-06			3.1E-08	1.8E-05
Total Child Resident				3.7E-05			3.9E-06			1.8E-08	4.1E-05
Total Adult/Child Resident		(89.3% Contribution)		5.3E-05	(10.6% Contribution)		6.3E-06	(0.1% Contribution)		4.8E-08	6.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-28
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 3 - Property 101-07-236
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 3, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.84E+01	3.11E-05	3.00E-04	1.04E-01	4.66E-06	3.00E-04	1.55E-02	5.91E-09	NA		1.2E-01
Copper	5.29E+03	7.25E-03	4.00E-02	1.81E-01	2.89E-04	4.00E-02	7.23E-03	1.10E-06	NA		1.9E-01
Child Resident											
Arsenic	2.84E+01	2.90E-04	3.00E-04	9.68E-01	3.05E-05	3.00E-04	1.02E-01	1.38E-08	NA		1.1E+00
Copper	5.29E+03	6.76E-02	4.00E-02	1.69E+00	1.89E-03	4.00E-02	4.73E-02	2.57E-06	NA		1.7E+00
Total Adult Resident				2.8E-01			2.3E-02			0.0E+00	0.31
Total Child Resident			(94.7% Contribution)	2.7E+00		(5.3% Contribution)	1.5E-01		(0% Contribution)	0.0E+00	2.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-29
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 3
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-219	**Adult Resident**	Arsenic	2.00E+01	1.13E-05	1.69E-06	2.15E-08	1.30E-05	7.31E-02	1.09E-02		8.40E-02
		Copper	4.00E+03					1.37E-01	5.47E-03		1.42E-01
		Total					1.3E-05				0.2
	Child Resident	Arsenic	2.00E+01	2.63E-05	2.76E-06	1.25E-08	2.91E-05	6.82E-01	7.16E-02		7.53E-01
		Copper	4.00E+03					1.28E+00	3.58E-02		1.31E+00
		Total					2.9E-05				2.1
	Adult/Child Resident	Arsenic	2.00E+01	3.76E-05	4.45E-06	3.40E-08	4.21E-05				
		Copper	4.00E+03								
		Total					4.2E-05				NA
101-07-234	**Adult Resident**	Arsenic	1.02E+01	5.75E-06	8.60E-07	1.10E-08	6.62E-06	3.73E-02	5.58E-03		4.28E-02
		Copper	2.79E+03					9.55E-02	3.81E-03		9.94E-02
		Total					6.6E-06				0.1
	Child Resident	Arsenic	1.02E+01	1.34E-05	1.41E-06	6.39E-09	1.48E-05	3.48E-01	3.65E-02		3.84E-01
		Copper	2.79E+03					8.92E-01	2.50E-02		9.17E-01
		Total					1.5E-05				1.3
	Adult/Child Resident	Arsenic	1.02E+01	1.92E-05	2.27E-06	1.73E-08	2.14E-05				
		Copper	2.79E+03								
		Total					2.1E-05				NA
101-07-236	**Adult Resident**	Arsenic	2.84E+01	1.60E-05	2.39E-06	3.05E-08	1.84E-05	1.04E-01	1.55E-02		1.19E-01
		Copper	5.29E+03					1.81E-01	7.23E-03		1.88E-01
		Total					1.8E-05				0.3
	Child Resident	Arsenic	2.84E+01	3.73E-05	3.92E-06	1.78E-08	4.13E-05	9.68E-01	1.02E-01		1.07E+00
		Copper	5.29E+03					1.69E+00	4.73E-02		1.74E+00
		Total					4.1E-05				2.8
	Adult/Child Resident	Arsenic	2.84E+01	5.34E-05	6.32E-06	4.83E-08	5.97E-05				
		Copper	5.29E+03								
		Total					6.0E-05				NA

Notes:
NA = Not applicable

Table A-30
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 3
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-219	4.2E-05	2.1
101-07-234	2.1E-05	1.3
101-07-236	6.0E-05	2.8

Table A-31
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-142A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.66E+01	6.24E-06	1.50E+00	9.36E-06	9.33E-07	1.50E+00	1.40E-06	1.18E-09	1.51E+01	1.78E-08	1.08E-05
Copper	2.52E+03	1.18E-03	NA		4.72E-05	NA		1.80E-07	NA		
Child Resident											
Arsenic	1.66E+01	1.46E-05	1.50E+00	2.18E-05	1.53E-06	1.50E+00	2.29E-06	6.91E-10	1.51E+01	1.04E-08	2.41E-05
Copper	2.52E+03	2.76E-03	NA		7.73E-05	NA		1.05E-07	NA		
Total Adult Resident				9.4E-06			1.4E-06			1.8E-08	1.1E-05
Total Child Resident				2.2E-05			2.3E-06			1.0E-08	2.4E-05
Total Adult/Child Resident		(89.3% Contribution)		3.1E-05	(10.6% Contribution)		3.7E-06	(0.1% Contribution)		2.8E-08	3.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-32
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-142A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.66E+01	1.82E-05	3.00E-04	6.06E-02	2.72E-06	3.00E-04	9.07E-03	3.46E-09	NA		6.97E-02
Copper	2.52E+03	3.45E-03	4.00E-02	8.63E-02	1.38E-04	4.00E-02	3.44E-03	5.25E-07	NA		8.97E-02
Child Resident											
Arsenic	1.66E+01	1.70E-04	3.00E-04	5.66E-01	1.78E-05	3.00E-04	5.94E-02	8.06E-09	NA		6.25E-01
Copper	2.52E+03	3.22E-02	4.00E-02	8.05E-01	9.02E-04	4.00E-02	2.26E-02	1.22E-06	NA		8.28E-01
Total Adult Resident				1.5E-01			1.3E-02			0.0E+00	0.16
Total Child Resident			(94.4% Contribution)	1.4E+00		(5.6% Contribution)	8.2E-02		(0% Contribution)	0.0E+00	1.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-33
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-149
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.08E+01	7.82E-06	1.50E+00	1.17E-05	1.17E-06	1.50E+00	1.75E-06	1.48E-09	1.51E+01	2.23E-08	1.35E-05
Copper	5.66E+03	2.66E-03	NA		1.06E-04	NA		4.04E-07	NA		
Child Resident											
Arsenic	2.08E+01	1.82E-05	1.50E+00	2.74E-05	1.91E-06	1.50E+00	2.87E-06	8.66E-10	1.51E+01	1.30E-08	3.02E-05
Copper	5.66E+03	6.20E-03	NA		1.74E-04	NA		2.36E-07	NA		
Total Adult Resident				1.2E-05			1.8E-06			2.2E-08	1.3E-05
Total Child Resident				2.7E-05			2.9E-06			1.3E-08	3.0E-05
Total Adult/Child Resident		(89.3% Contribution)		3.9E-05	(10.6% Contribution)		4.6E-06	(0.1% Contribution)		3.5E-08	4.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-34
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-149
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.08E+01	2.28E-05	3.00E-04	7.60E-02	3.41E-06	3.00E-04	1.14E-02	4.33E-09	NA		8.74E-02
Copper	5.66E+03	7.75E-03	4.00E-02	1.94E-01	3.09E-04	4.00E-02	7.73E-03	1.18E-06	NA		2.02E-01
Child Resident											
Arsenic	2.08E+01	2.13E-04	3.00E-04	7.09E-01	2.23E-05	3.00E-04	7.45E-02	1.01E-08	NA		7.84E-01
Copper	5.66E+03	7.24E-02	4.00E-02	1.81E+00	2.03E-03	4.00E-02	5.07E-02	2.75E-06	NA		1.86E+00
Total Adult Resident				2.7E-01			1.9E-02			0.0E+00	0.29
Total Child Resident			(95.3% Contribution)	2.5E+00		(4.7% Contribution)	1.3E-01		(0% Contribution)	0.0E+00	2.6

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-35
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-251
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.63E+01	6.12E-06	1.50E+00	9.19E-06	9.16E-07	1.50E+00	1.37E-06	1.16E-09	1.51E+01	1.75E-08	1.06E-05
Copper	3.76E+03	1.77E-03	NA		7.05E-05	NA		2.68E-07	NA		
Child Resident											
Arsenic	1.63E+01	1.43E-05	1.50E+00	2.14E-05	1.50E-06	1.50E+00	2.25E-06	6.79E-10	1.51E+01	1.02E-08	2.37E-05
Copper	3.76E+03	4.12E-03	NA		1.15E-04	NA		1.57E-07	NA		
Total Adult Resident				9.2E-06			1.4E-06			1.8E-08	1.1E-05
Total Child Resident				2.1E-05			2.3E-06			1.0E-08	2.4E-05
Total Adult/Child Resident		(89.3% Contribution)		3.1E-05	(10.6% Contribution)		3.6E-06	(0.1% Contribution)		2.8E-08	3.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-36
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-251
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	1.63E+01	1.79E-05	3.00E-04	5.95E-02	2.67E-06	3.00E-04	8.91E-03	3.39E-09	NA		6.85E-02
Copper	3.76E+03	5.15E-03	4.00E-02	1.29E-01	2.06E-04	4.00E-02	5.14E-03	7.83E-07	NA		1.34E-01
Child Resident											
Arsenic	1.63E+01	1.67E-04	3.00E-04	5.56E-01	1.75E-05	3.00E-04	5.84E-02	7.92E-09	NA		6.14E-01
Copper	3.76E+03	4.81E-02	4.00E-02	1.20E+00	1.35E-03	4.00E-02	3.37E-02	1.83E-06	NA		1.24E+00
Total Adult Resident				1.9E-01			1.4E-02			0.0E+00	0.20
Total Child Resident			(95% Contribution)	1.8E+00		(5% Contribution)	9.2E-02		(0% Contribution)	0.0E+00	1.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-37
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-259
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.34E+01	5.03E-06	1.50E+00	7.55E-06	7.53E-07	1.50E+00	1.13E-06	9.56E-10	1.51E+01	1.44E-08	8.70E-06
Copper	3.35E+03	1.57E-03	NA		6.28E-05	NA		2.39E-07	NA		
Child Resident											
Arsenic	1.34E+01	1.17E-05	1.50E+00	1.76E-05	1.23E-06	1.50E+00	1.85E-06	5.58E-10	1.51E+01	8.40E-09	1.95E-05
Copper	3.35E+03	3.67E-03	NA		1.03E-04	NA		1.39E-07	NA		
Total Adult Resident				7.6E-06			1.1E-06			1.4E-08	8.7E-06
Total Child Resident				1.8E-05			1.9E-06			8.4E-09	1.9E-05
Total Adult/Child Resident		(89.3% Contribution)		2.5E-05	(10.6% Contribution)		3.0E-06	(0.1% Contribution)		2.3E-08	2.8E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-38
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 4 - Property 101-07-259
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 4, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	1.34E+01	1.47E-05	3.00E-04	4.89E-02	2.20E-06	3.00E-04	7.32E-03	2.79E-09	NA		5.63E-02
Copper	3.35E+03	4.59E-03	4.00E-02	1.15E-01	1.83E-04	4.00E-02	4.58E-03	6.97E-07	NA		1.19E-01
Child Resident											
Arsenic	1.34E+01	1.37E-04	3.00E-04	4.57E-01	1.44E-05	3.00E-04	4.80E-02	6.51E-09	NA		5.05E-01
Copper	3.35E+03	4.28E-02	4.00E-02	1.07E+00	1.20E-03	4.00E-02	3.00E-02	1.63E-06	NA		1.10E+00
Total Adult Resident				1.6E-01			1.2E-02			0.0E+00	0.18
Total Child Resident			(95.1% Contribution)	1.5E+00		(4.9% Contribution)	7.8E-02		(0% Contribution)	0.0E+00	1.6

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-39
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 4
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-142A	**Adult Resident**	Arsenic	1.66E+01	9.36E-06	1.40E-06	1.78E-08	1.08E-05	6.06E-02	9.07E-03		6.97E-02
		Copper	2.52E+03					8.63E-02	3.44E-03		8.97E-02
		Total					1.1E-05				0.2
	Child Resident	Arsenic	1.66E+01	2.18E-05	2.29E-06	1.04E-08	2.41E-05	5.66E-01	5.94E-02		6.25E-01
		Copper	2.52E+03					8.05E-01	2.26E-02		8.28E-01
		Total					2.4E-05				1.5
	Adult/Child Resident	Arsenic	1.66E+01	3.12E-05	3.69E-06	2.82E-08	3.49E-05				
		Copper	2.52E+03								
		Total					3.5E-05				NA
101-07-149	**Adult Resident**	Arsenic	2.08E+01	1.17E-05	1.75E-06	2.23E-08	1.35E-05	7.60E-02	1.14E-02		8.74E-02
		Copper	5.66E+03					1.94E-01	7.73E-03		2.02E-01
		Total					1.3E-05				0.3
	Child Resident	Arsenic	2.08E+01	2.74E-05	2.87E-06	1.30E-08	3.02E-05	7.09E-01	7.45E-02		7.84E-01
		Copper	5.66E+03					1.81E+00	5.07E-02		1.86E+00
		Total					3.0E-05				2.6
	Adult/Child Resident	Arsenic	2.08E+01	3.91E-05	4.63E-06	3.54E-08	4.37E-05				
		Copper	5.66E+03								
		Total					4.4E-05				NA
101-07-251	**Adult Resident**	Arsenic	1.63E+01	9.19E-06	1.37E-06	1.75E-08	1.06E-05	5.95E-02	8.91E-03		6.85E-02
		Copper	3.76E+03					1.29E-01	5.14E-03		1.34E-01
		Total					1.1E-05				0.2
	Child Resident	Arsenic	1.63E+01	2.14E-05	2.25E-06	1.02E-08	2.37E-05	5.56E-01	5.84E-02		6.14E-01
		Copper	3.76E+03					1.20E+00	3.37E-02		1.24E+00
		Total					2.4E-05				1.8
	Adult/Child Resident	Arsenic	1.63E+01	3.06E-05	3.63E-06	2.77E-08	3.43E-05				
		Copper	3.76E+03								
		Total					3.4E-05				NA

Table A-39
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 4
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-07-259	**Adult Resident**	Arsenic	1.34E+01	7.55E-06	1.13E-06	1.44E-08	8.70E-06	4.89E-02	7.32E-03		5.63E-02
		Copper	3.35E+03					1.15E-01	4.58E-03		1.19E-01
		Total					8.7E-06				0.2
	Child Resident	Arsenic	1.34E+01	1.76E-05	1.85E-06	8.40E-09	1.95E-05	4.57E-01	4.80E-02		5.05E-01
		Copper	3.35E+03					1.07E+00	3.00E-02		1.10E+00
		Total					1.9E-05				1.6
	Adult/Child Resident	Arsenic	1.34E+01	2.52E-05	2.98E-06	2.28E-08	2.82E-05				
		Copper	3.35E+03								
		Total					2.8E-05				NA

Notes:
NA = Not applicable

Table A-40
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 4
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-142A	3.5E-05	1.5
101-07-149	4.4E-05	2.6
101-07-251	3.4E-05	1.8
101-07-259	2.8E-05	1.6

Table A-41
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-129
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.56E+01	9.62E-06	1.50E+00	1.44E-05	1.44E-06	1.50E+00	2.16E-06	1.83E-09	1.51E+01	2.75E-08	1.66E-05
Copper	6.50E+03	3.05E-03	NA		1.22E-04	NA		4.64E-07	NA		
Child Resident											
Arsenic	2.56E+01	2.24E-05	1.50E+00	3.37E-05	2.36E-06	1.50E+00	3.53E-06	1.07E-09	1.51E+01	1.60E-08	3.72E-05
Copper	6.50E+03	7.12E-03	NA		1.99E-04	NA		2.71E-07	NA		
Total Adult Resident				1.4E-05			2.2E-06			2.8E-08	1.7E-05
Total Child Resident				3.4E-05			3.5E-06			1.6E-08	3.7E-05
Total Adult/Child Resident		(89.3% Contribution)		4.8E-05	(10.6% Contribution)		5.7E-06	(0.1% Contribution)		4.4E-08	5.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-42
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-129
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	2.56E+01	2.81E-05	3.00E-04	9.35E-02	4.20E-06	3.00E-04	1.40E-02	5.33E-09	NA		1.08E-01
Copper	6.50E+03	8.90E-03	4.00E-02	2.23E-01	3.55E-04	4.00E-02	8.88E-03	1.35E-06	NA		2.31E-01
Child Resident											
Arsenic	2.56E+01	2.62E-04	3.00E-04	8.73E-01	2.75E-05	3.00E-04	9.16E-02	1.24E-08	NA		9.64E-01
Copper	6.50E+03	8.31E-02	4.00E-02	2.08E+00	2.33E-03	4.00E-02	5.82E-02	3.16E-06	NA		2.14E+00
Total Adult Resident				3.2E-01			2.3E-02			0.0E+00	0.34
Total Child Resident			(95.2% Contribution)	3.0E+00		(4.8% Contribution)	1.5E-01		(0% Contribution)	0.0E+00	3.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-43
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-301
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.25E+01	8.45E-06	1.50E+00	1.27E-05	1.26E-06	1.50E+00	1.90E-06	1.61E-09	1.51E+01	2.42E-08	1.46E-05
Copper	9.40E+03	4.41E-03	NA		1.76E-04	NA		6.71E-07	NA		
Child Resident											
Arsenic	2.25E+01	1.97E-05	1.50E+00	2.96E-05	2.07E-06	1.50E+00	3.11E-06	9.37E-10	1.51E+01	1.41E-08	3.27E-05
Copper	9.40E+03	1.03E-02	NA		2.88E-04	NA		3.91E-07	NA		
Total Adult Resident				1.3E-05			1.9E-06			2.4E-08	1.5E-05
Total Child Resident				3.0E-05			3.1E-06			1.4E-08	3.3E-05
Total Adult/Child Resident		(89.3% Contribution)		4.2E-05	(10.6% Contribution)		5.0E-06	(0.1% Contribution)		3.8E-08	4.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-44
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-301
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.25E+01	2.47E-05	3.00E-04	8.22E-02	3.69E-06	3.00E-04	1.23E-02	4.68E-09	NA		9.45E-02
Copper	9.40E+03	1.29E-02	4.00E-02	3.22E-01	5.14E-04	4.00E-02	1.28E-02	1.96E-06	NA		3.35E-01
Child Resident											
Arsenic	2.25E+01	2.30E-04	3.00E-04	7.67E-01	2.42E-05	3.00E-04	8.05E-02	1.09E-08	NA		8.48E-01
Copper	9.40E+03	1.20E-01	4.00E-02	3.00E+00	3.37E-03	4.00E-02	8.41E-02	4.57E-06	NA		3.09E+00
Total Adult Resident				4.0E-01			2.5E-02			0.0E+00	0.43
Total Child Resident			(95.8% Contribution)	3.8E+00		(4.2% Contribution)	1.6E-01		(0% Contribution)	0.0E+00	3.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-45
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-303
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.42E+01	5.34E-06	1.50E+00	8.00E-06	7.98E-07	1.50E+00	1.20E-06	1.01E-09	1.51E+01	1.53E-08	9.22E-06
Copper	1.05E+04	4.93E-03	NA		1.97E-04	NA		7.49E-07	NA		
Child Resident											
Arsenic	1.42E+01	1.24E-05	1.50E+00	1.87E-05	1.31E-06	1.50E+00	1.96E-06	5.91E-10	1.51E+01	8.90E-09	2.06E-05
Copper	1.05E+04	1.15E-02	NA		3.22E-04	NA		4.37E-07	NA		
Total Adult Resident				8.0E-06			1.2E-06			1.5E-08	9.2E-06
Total Child Resident				1.9E-05			2.0E-06			8.9E-09	2.1E-05
Total Adult/Child Resident		(89.3% Contribution)		2.7E-05	(10.6% Contribution)		3.2E-06	(0.1% Contribution)		2.4E-08	3.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-46
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-303
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	1.42E+01	1.56E-05	3.00E-04	5.19E-02	2.33E-06	3.00E-04	7.76E-03	2.96E-09	NA		5.96E-02
Copper	1.05E+04	1.44E-02	4.00E-02	3.60E-01	5.74E-04	4.00E-02	1.43E-02	2.19E-06	NA		3.74E-01
Child Resident											
Arsenic	1.42E+01	1.45E-04	3.00E-04	4.84E-01	1.53E-05	3.00E-04	5.08E-02	6.90E-09	NA		5.35E-01
Copper	1.05E+04	1.34E-01	4.00E-02	3.36E+00	3.76E-03	4.00E-02	9.40E-02	5.10E-06	NA		3.45E+00
Total Adult Resident				4.1E-01			2.2E-02			0.0E+00	0.43
Total Child Resident			(96.4% Contribution)	3.8E+00		(3.6% Contribution)	1.4E-01		(0% Contribution)	0.0E+00	4.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-47
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-304A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.46E+01	9.24E-06	1.50E+00	1.39E-05	1.38E-06	1.50E+00	2.07E-06	1.76E-09	1.51E+01	2.64E-08	1.60E-05
Copper	6.55E+03	3.08E-03	NA		1.23E-04	NA		4.68E-07	NA		
Child Resident											
Arsenic	2.46E+01	2.16E-05	1.50E+00	3.24E-05	2.26E-06	1.50E+00	3.40E-06	1.02E-09	1.51E+01	1.54E-08	3.58E-05
Copper	6.55E+03	7.18E-03	NA		2.01E-04	NA		2.73E-07	NA		
Total Adult Resident				1.4E-05			2.1E-06			2.6E-08	1.6E-05
Total Child Resident				3.2E-05			3.4E-06			1.5E-08	3.6E-05
Total Adult/Child Resident		(89.3% Contribution)		4.6E-05	(10.6% Contribution)		5.5E-06	(0.1% Contribution)		4.2E-08	5.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-48
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 5 - Property 101-07-304A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 5, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.46E+01	2.70E-05	3.00E-04	8.99E-02	4.03E-06	3.00E-04	1.34E-02	5.12E-09	NA		1.03E-01
Copper	6.55E+03	8.97E-03	4.00E-02	2.24E-01	3.58E-04	4.00E-02	8.95E-03	1.36E-06	NA		2.33E-01
Child Resident											
Arsenic	2.46E+01	2.52E-04	3.00E-04	8.39E-01	2.64E-05	3.00E-04	8.81E-02	1.19E-08	NA		9.27E-01
Copper	6.55E+03	8.37E-02	4.00E-02	2.09E+00	2.34E-03	4.00E-02	5.86E-02	3.18E-06	NA		2.15E+00
Total Adult Resident				3.1E-01			2.2E-02			0.0E+00	0.34
Total Child Resident			(95.2% Contribution)	2.9E+00		(4.8% Contribution)	1.5E-01		(0% Contribution)	0.0E+00	3.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-49
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 5
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-129	**Adult Resident**	Arsenic	2.56E+01	1.44E-05	2.16E-06	2.75E-08	1.66E-05	9.35E-02	1.40E-02		1.08E-01
		Copper	6.50E+03					2.23E-01	8.88E-03		2.31E-01
		Total					1.7E-05				0.3
	Child Resident	Arsenic	2.56E+01	3.37E-05	3.53E-06	1.60E-08	3.72E-05	8.73E-01	9.16E-02		9.64E-01
		Copper	6.50E+03					2.08E+00	5.82E-02		2.14E+00
		Total					3.7E-05				3.1
	Adult/Child Resident	Arsenic	2.56E+01	4.81E-05	5.69E-06	4.35E-08	5.38E-05				
		Copper	6.50E+03								
		Total					5.4E-05				NA
101-07-301	**Adult Resident**	Arsenic	2.25E+01	1.27E-05	1.90E-06	2.42E-08	1.46E-05	8.22E-02	1.23E-02		9.45E-02
		Copper	9.40E+03					3.22E-01	1.28E-02		3.35E-01
		Total					1.5E-05				0.4
	Child Resident	Arsenic	2.25E+01	2.96E-05	3.11E-06	1.41E-08	3.27E-05	7.67E-01	8.05E-02		8.48E-01
		Copper	9.40E+03					3.00E+00	8.41E-02		3.09E+00
		Total					3.3E-05				3.9
	Adult/Child Resident	Arsenic	2.25E+01	4.23E-05	5.00E-06	3.83E-08	4.73E-05				
		Copper	9.40E+03								
		Total					4.7E-05				NA
101-07-303	**Adult Resident**	Arsenic	1.42E+01	8.00E-06	1.20E-06	1.53E-08	9.22E-06	5.19E-02	7.76E-03		5.96E-02
		Copper	1.05E+04					3.60E-01	1.43E-02		3.74E-01
		Total					9.2E-06				0.4
	Child Resident	Arsenic	1.42E+01	1.87E-05	1.96E-06	8.90E-09	2.06E-05	4.84E-01	5.08E-02		5.35E-01
		Copper	1.05E+04					3.36E+00	9.40E-02		3.45E+00
		Total					2.1E-05				4.0
	Adult/Child Resident	Arsenic	1.42E+01	2.67E-05	3.16E-06	2.42E-08	2.99E-05				
		Copper	1.05E+04								
		Total					3.0E-05				NA

Table A-49
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 5
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-07-304A	**Adult Resident**	Arsenic	2.46E+01	1.39E-05	2.07E-06	2.64E-08	1.60E-05	8.99E-02	1.34E-02		1.03E-01
		Copper	6.55E+03					2.24E-01	8.95E-03		2.33E-01
		Total					1.6E-05				0.3
	Child Resident	Arsenic	2.46E+01	3.24E-05	3.40E-06	1.54E-08	3.58E-05	8.39E-01	8.81E-02		9.27E-01
		Copper	6.55E+03					2.09E+00	5.86E-02		2.15E+00
		Total					3.6E-05				3.1
	Adult/Child Resident	Arsenic	2.46E+01	4.62E-05	5.47E-06	4.18E-08	5.17E-05				
		Copper	6.55E+03								
		Total					5.2E-05				NA

Notes:
NA = Not applicable

Table A-50
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 5
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-129	5.4E-05	3.1
101-07-301	4.7E-05	3.9
101-07-303	3.0E-05	4.0
101-07-304A	5.2E-05	3.1

Table A-51
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-111
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.53E+01	5.75E-06	1.50E+00	8.62E-06	8.60E-07	1.50E+00	1.29E-06	1.09E-09	1.51E+01	1.64E-08	9.93E-06
Copper	6.40E+03	3.01E-03	NA		1.20E-04	NA		4.57E-07	NA		
Child Resident											
Arsenic	1.53E+01	1.34E-05	1.50E+00	2.01E-05	1.41E-06	1.50E+00	2.11E-06	6.37E-10	1.51E+01	9.59E-09	2.22E-05
Copper	6.40E+03	7.01E-03	NA		1.96E-04	NA		2.66E-07	NA		
Total Adult Resident				8.6E-06			1.3E-06			1.6E-08	9.9E-06
Total Child Resident				2.0E-05			2.1E-06			9.6E-09	2.2E-05
Total Adult/Child Resident		(89.3% Contribution)		2.9E-05	(10.6% Contribution)		3.4E-06	(0.1% Contribution)		2.6E-08	3.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-52
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-111
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.53E+01	1.68E-05	3.00E-04	5.59E-02	2.51E-06	3.00E-04	8.36E-03	3.19E-09	NA		6.43E-02
Copper	6.40E+03	8.77E-03	4.00E-02	2.19E-01	3.50E-04	4.00E-02	8.75E-03	1.33E-06	NA		2.28E-01
Child Resident											
Arsenic	1.53E+01	1.56E-04	3.00E-04	5.22E-01	1.64E-05	3.00E-04	5.48E-02	7.43E-09	NA		5.76E-01
Copper	6.40E+03	8.18E-02	4.00E-02	2.05E+00	2.29E-03	4.00E-02	5.73E-02	3.11E-06	NA		2.10E+00
Total Adult Resident				2.8E-01			1.7E-02			0.0E+00	0.29
Total Child Resident			(95.8% Contribution)	2.6E+00		(4.2% Contribution)	1.1E-01		(0% Contribution)	0.0E+00	2.7

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-53
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-117
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.60E+01	1.35E-05	1.50E+00	2.03E-05	2.02E-06	1.50E+00	3.04E-06	2.57E-09	1.51E+01	3.87E-08	2.34E-05
Copper	1.13E+04	5.31E-03	NA		2.12E-04	NA		8.07E-07	NA		
Child Resident											
Arsenic	3.60E+01	3.16E-05	1.50E+00	4.73E-05	3.31E-06	1.50E+00	4.97E-06	1.50E-09	1.51E+01	2.26E-08	5.23E-05
Copper	1.13E+04	1.24E-02	NA		3.47E-04	NA		4.71E-07	NA		
Total Adult Resident				2.0E-05			3.0E-06			3.9E-08	2.3E-05
Total Child Resident				4.7E-05			5.0E-06			2.3E-08	5.2E-05
Total Adult/Child Resident		(89.3% Contribution)		6.8E-05	(10.6% Contribution)		8.0E-06	(0.1% Contribution)		6.1E-08	7.6E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-54
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-117
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.60E+01	3.95E-05	3.00E-04	1.32E-01	5.90E-06	3.00E-04	1.97E-02	7.49E-09	NA		1.51E-01
Copper	1.13E+04	1.55E-02	4.00E-02	3.87E-01	6.18E-04	4.00E-02	1.54E-02	2.35E-06	NA		4.02E-01
Child Resident											
Arsenic	3.60E+01	3.68E-04	3.00E-04	1.23E+00	3.87E-05	3.00E-04	1.29E-01	1.75E-08	NA		1.36E+00
Copper	1.13E+04	1.44E-01	4.00E-02	3.61E+00	4.05E-03	4.00E-02	1.01E-01	5.49E-06	NA		3.71E+00
Total Adult Resident				5.2E-01			3.5E-02			0.0E+00	0.55
Total Child Resident			(95.5% Contribution)	4.8E+00		(4.5% Contribution)	2.3E-01		(0% Contribution)	0.0E+00	5.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-55
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-284
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.80E+01	6.76E-06	1.50E+00	1.01E-05	1.01E-06	1.50E+00	1.52E-06	1.28E-09	1.51E+01	1.93E-08	1.17E-05
Copper	6.48E+03	3.04E-03	NA		1.21E-04	NA		4.63E-07	NA		
Child Resident											
Arsenic	1.80E+01	1.58E-05	1.50E+00	2.37E-05	1.66E-06	1.50E+00	2.49E-06	7.49E-10	1.51E+01	1.13E-08	2.62E-05
Copper	6.48E+03	7.10E-03	NA		1.99E-04	NA		2.70E-07	NA		
Total Adult Resident				1.0E-05			1.5E-06			1.9E-08	1.2E-05
Total Child Resident				2.4E-05			2.5E-06			1.1E-08	2.6E-05
Total Adult/Child Resident		(89.3% Contribution)		3.4E-05	(10.6% Contribution)		4.0E-06	(0.1% Contribution)		3.1E-08	3.8E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-56
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-284
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	1.80E+01	1.97E-05	3.00E-04	6.58E-02	2.95E-06	3.00E-04	9.84E-03	3.75E-09	NA		7.56E-02
Copper	6.48E+03	8.88E-03	4.00E-02	2.22E-01	3.54E-04	4.00E-02	8.85E-03	1.35E-06	NA		2.31E-01
Child Resident											
Arsenic	1.80E+01	1.84E-04	3.00E-04	6.14E-01	1.93E-05	3.00E-04	6.44E-02	8.74E-09	NA		6.78E-01
Copper	6.48E+03	8.28E-02	4.00E-02	2.07E+00	2.32E-03	4.00E-02	5.80E-02	3.15E-06	NA		2.13E+00
Total Adult Resident				2.9E-01			1.9E-02			0.0E+00	0.31
Total Child Resident			(95.6% Contribution)	2.7E+00		(4.4% Contribution)	1.2E-01		(0% Contribution)	0.0E+00	2.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-57
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-286
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.04E+01	7.66E-06	1.50E+00	1.15E-05	1.15E-06	1.50E+00	1.72E-06	1.46E-09	1.51E+01	2.19E-08	1.32E-05
Copper	6.93E+03	3.25E-03	NA		1.30E-04	NA		4.95E-07	NA		
Child Resident											
Arsenic	2.04E+01	1.79E-05	1.50E+00	2.68E-05	1.88E-06	1.50E+00	2.82E-06	8.49E-10	1.51E+01	1.28E-08	2.97E-05
Copper	6.93E+03	7.59E-03	NA		2.13E-04	NA		2.89E-07	NA		
Total Adult Resident				1.1E-05			1.7E-06			2.2E-08	1.3E-05
Total Child Resident				2.7E-05			2.8E-06			1.3E-08	3.0E-05
Total Adult/Child Resident		(89.3% Contribution)		3.8E-05	(10.6% Contribution)		4.5E-06	(0.1% Contribution)		3.5E-08	4.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-58
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 6 - Property 101-07-286
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 6, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.04E+01	2.24E-05	3.00E-04	7.45E-02	3.35E-06	3.00E-04	1.12E-02	4.25E-09	NA		8.57E-02
Copper	6.93E+03	9.49E-03	4.00E-02	2.37E-01	3.79E-04	4.00E-02	9.47E-03	1.44E-06	NA		2.47E-01
Child Resident											
Arsenic	2.04E+01	2.09E-04	3.00E-04	6.96E-01	2.19E-05	3.00E-04	7.30E-02	9.91E-09	NA		7.69E-01
Copper	6.93E+03	8.86E-02	4.00E-02	2.22E+00	2.48E-03	4.00E-02	6.20E-02	3.37E-06	NA		2.28E+00
Total Adult Resident				3.1E-01			2.1E-02			0.0E+00	0.33
Total Child Resident			(95.6% Contribution)	2.9E+00		(4.4% Contribution)	1.4E-01		(0% Contribution)	0.0E+00	3.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-59
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 6
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-111	**Adult Resident**	Arsenic	1.53E+01	8.62E-06	1.29E-06	1.64E-08	9.93E-06	5.59E-02	8.36E-03		6.43E-02
		Copper	6.40E+03					2.19E-01	8.75E-03		2.28E-01
		Total					9.9E-06				0.3
	Child Resident	Arsenic	1.53E+01	2.01E-05	2.11E-06	9.59E-09	2.22E-05	5.22E-01	5.48E-02		5.76E-01
		Copper	6.40E+03					2.05E+00	5.73E-02		2.10E+00
		Total					2.2E-05				2.7
	Adult/Child Resident	Arsenic	1.53E+01	2.87E-05	3.40E-06	2.60E-08	3.22E-05				
		Copper	6.40E+03								
		Total					3.2E-05				NA
101-07-117	**Adult Resident**	Arsenic	3.60E+01	2.03E-05	3.04E-06	3.87E-08	2.34E-05	1.32E-01	1.97E-02		1.51E-01
		Copper	1.13E+04					3.87E-01	1.54E-02		4.02E-01
		Total					2.3E-05				0.6
	Child Resident	Arsenic	3.60E+01	4.73E-05	4.97E-06	2.26E-08	5.23E-05	1.23E+00	1.29E-01		1.36E+00
		Copper	1.13E+04					3.61E+00	1.01E-01		3.71E+00
		Total					5.2E-05				5.1
	Adult/Child Resident	Arsenic	3.60E+01	6.76E-05	8.01E-06	6.12E-08	7.57E-05				
		Copper	1.13E+04								
		Total					7.6E-05				NA
101-07-284	**Adult Resident**	Arsenic	1.80E+01	1.01E-05	1.52E-06	1.93E-08	1.17E-05	6.58E-02	9.84E-03		7.56E-02
		Copper	6.48E+03					2.22E-01	8.85E-03		2.31E-01
		Total					1.2E-05				0.3
	Child Resident	Arsenic	1.80E+01	2.37E-05	2.49E-06	1.13E-08	2.62E-05	6.14E-01	6.44E-02		6.78E-01
		Copper	6.48E+03					2.07E+00	5.80E-02		2.13E+00
		Total					2.6E-05				2.8
	Adult/Child Resident	Arsenic	1.80E+01	3.38E-05	4.00E-06	3.06E-08	3.79E-05				
		Copper	6.48E+03								
		Total					3.8E-05				NA

Table A-59
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 6
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-07-286	**Adult Resident**	Arsenic	2.04E+01	1.15E-05	1.72E-06	2.19E-08	1.32E-05	7.45E-02	1.12E-02		8.57E-02
		Copper	6.93E+03					2.37E-01	9.47E-03		2.47E-01
		Total					1.3E-05				0.3
	Child Resident	Arsenic	2.04E+01	2.68E-05	2.82E-06	1.28E-08	2.97E-05	6.96E-01	7.30E-02		7.69E-01
		Copper	6.93E+03					2.22E+00	6.20E-02		2.28E+00
		Total					3.0E-05				3.0
	Adult/Child Resident	Arsenic	2.04E+01	3.83E-05	4.54E-06	3.47E-08	4.29E-05				
		Copper	6.93E+03								
		Total					4.3E-05				NA

Notes:
NA = Not applicable

Table A-60
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 6
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-111	3.2E-05	2.7
101-07-117	7.6E-05	5.1
101-07-284	3.8E-05	2.8
101-07-286	4.3E-05	3.0

Table A-61
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-099
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 7, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.80E+01	2.18E-05	1.50E+00	3.27E-05	3.26E-06	1.50E+00	4.89E-06	4.14E-09	1.51E+01	6.23E-08	3.76E-05
Copper	1.48E+04	6.95E-03	NA		2.77E-04	NA		1.06E-06	NA		
Child Resident											
Arsenic	5.80E+01	5.08E-05	1.50E+00	7.63E-05	5.34E-06	1.50E+00	8.01E-06	2.41E-09	1.51E+01	3.63E-08	8.43E-05
Copper	1.48E+04	1.62E-02	NA		4.54E-04	NA		6.16E-07	NA		
Total Adult Resident				3.3E-05			4.9E-06			6.2E-08	3.8E-05
Total Child Resident				7.6E-05			8.0E-06			3.6E-08	8.4E-05
Total Adult/Child Resident		(89.3% Contribution)		1.1E-04	(10.6% Contribution)		1.3E-05	(0.1% Contribution)		9.9E-08	1.2E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-62
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-099
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 7, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.80E+01	6.36E-05	3.00E-04	2.12E-01	9.51E-06	3.00E-04	3.17E-02	1.21E-08	NA		2.44E-01
Copper	1.48E+04	2.03E-02	4.00E-02	5.07E-01	8.09E-04	4.00E-02	2.02E-02	3.08E-06	NA		5.27E-01
Child Resident											
Arsenic	5.80E+01	5.93E-04	3.00E-04	1.98E+00	6.23E-05	3.00E-04	2.08E-01	2.82E-08	NA		2.19E+00
Copper	1.48E+04	1.89E-01	4.00E-02	4.73E+00	5.30E-03	4.00E-02	1.32E-01	7.19E-06	NA		4.86E+00
Total Adult Resident				7.2E-01			5.2E-02			0.0E+00	0.77
Total Child Resident		(95.2% Contribution)		6.7E+00	(4.8% Contribution)		3.4E-01	(0% Contribution)		0.0E+00	7.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-63
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-104
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 7, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.14E+01	8.04E-06	1.50E+00	1.21E-05	1.20E-06	1.50E+00	1.80E-06	1.53E-09	1.51E+01	2.30E-08	1.39E-05
Copper	1.09E+04	5.12E-03	NA		2.04E-04	NA		7.78E-07	NA		
Child Resident											
Arsenic	2.14E+01	1.88E-05	1.50E+00	2.81E-05	1.97E-06	1.50E+00	2.95E-06	8.91E-10	1.51E+01	1.34E-08	3.11E-05
Copper	1.09E+04	1.19E-02	NA		3.34E-04	NA		4.54E-07	NA		
Total Adult Resident				1.2E-05			1.8E-06			2.3E-08	1.4E-05
Total Child Resident				2.8E-05			3.0E-06			1.3E-08	3.1E-05
Total Adult/Child Resident			(89.3% Contribution)	4.0E-05		(10.6% Contribution)	4.8E-06		(0.1% Contribution)	3.6E-08	4.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-64
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-104
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 7, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.14E+01	2.35E-05	3.00E-04	7.82E-02	3.51E-06	3.00E-04	1.17E-02	4.46E-09	NA		9.0E-02
Copper	1.09E+04	1.49E-02	4.00E-02	3.73E-01	5.96E-04	4.00E-02	1.49E-02	2.27E-06	NA		3.9E-01
Child Resident											
Arsenic	2.14E+01	2.19E-04	3.00E-04	7.30E-01	2.30E-05	3.00E-04	7.66E-02	1.04E-08	NA		8.1E-01
Copper	1.09E+04	1.39E-01	4.00E-02	3.48E+00	3.90E-03	4.00E-02	9.76E-02	5.29E-06	NA		3.6E+00
Total Adult Resident				4.5E-01			2.7E-02			0.0E+00	0.48
Total Child Resident			(96% Contribution)	4.2E+00		(4% Contribution)	1.7E-01		(0% Contribution)	0.0E+00	4.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-65
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-270
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 7, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.77E+01	2.17E-05	1.50E+00	3.25E-05	3.24E-06	1.50E+00	4.87E-06	4.12E-09	1.51E+01	6.20E-08	3.74E-05
Copper	1.75E+04	8.22E-03	NA		3.28E-04	NA		1.25E-06	NA		
Child Resident											
Arsenic	5.77E+01	5.06E-05	1.50E+00	7.59E-05	5.31E-06	1.50E+00	7.97E-06	2.40E-09	1.51E+01	3.62E-08	8.39E-05
Copper	1.75E+04	1.92E-02	NA		5.37E-04	NA		7.29E-07	NA		
Total Adult Resident				3.3E-05			4.9E-06			6.2E-08	3.7E-05
Total Child Resident				7.6E-05			8.0E-06			3.6E-08	8.4E-05
Total Adult/Child Resident		(89.3% Contribution)		1.1E-04	(10.6% Contribution)		1.3E-05	(0.1% Contribution)		9.8E-08	1.2E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-66
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 7 - Property 101-07-270
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 7, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.77E+01	6.32E-05	3.00E-04	2.11E-01	9.46E-06	3.00E-04	3.15E-02	1.20E-08	NA		2.4E-01
Copper	1.75E+04	2.40E-02	4.00E-02	5.99E-01	9.57E-04	4.00E-02	2.39E-02	3.64E-06	NA		6.2E-01
Child Resident											
Arsenic	5.77E+01	5.90E-04	3.00E-04	1.97E+00	6.20E-05	3.00E-04	2.07E-01	2.80E-08	NA		2.2E+00
Copper	1.75E+04	2.24E-01	4.00E-02	5.59E+00	6.26E-03	4.00E-02	1.57E-01	8.50E-06	NA		5.8E+00
Total Adult Resident				8.1E-01			5.5E-02			0.0E+00	0.87
Total Child Resident			(95.4% Contribution)	7.6E+00		(4.6% Contribution)	3.6E-01		(0% Contribution)	0.0E+00	7.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-67
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 7
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-099	**Adult Resident**	Arsenic	5.80E+01	3.27E-05	4.89E-06	6.23E-08	3.76E-05	2.12E-01	3.17E-02		2.44E-01
		Copper	1.48E+04					5.07E-01	2.02E-02		5.27E-01
		Total					3.8E-05				0.8
	Child Resident	Arsenic	5.80E+01	7.63E-05	8.01E-06	3.63E-08	8.43E-05	1.98E+00	2.08E-01		2.19E+00
		Copper	1.48E+04					4.73E+00	1.32E-01		4.86E+00
		Total					8.4E-05				7.0
	Adult/Child Resident	Arsenic	5.80E+01	1.09E-04	1.29E-05	9.87E-08	1.22E-04				
		Copper	1.48E+04								
		Total					1.2E-04				NA
101-07-104	**Adult Resident**	Arsenic	2.14E+01	1.21E-05	1.80E-06	2.30E-08	1.39E-05	7.82E-02	1.17E-02		8.99E-02
		Copper	1.09E+04					3.73E-01	1.49E-02		3.88E-01
		Total					1.4E-05				0.5
	Child Resident	Arsenic	2.14E+01	2.81E-05	2.95E-06	1.34E-08	3.11E-05	7.30E-01	7.66E-02		8.06E-01
		Copper	1.09E+04					3.48E+00	9.76E-02		3.58E+00
		Total					3.1E-05				4.4
	Adult/Child Resident	Arsenic	2.14E+01	4.02E-05	4.76E-06	3.64E-08	4.50E-05				
		Copper	1.09E+04								
		Total					4.5E-05				NA
101-07-270	**Adult Resident**	Arsenic	5.77E+01	3.25E-05	4.87E-06	6.20E-08	3.74E-05	2.11E-01	3.15E-02		2.42E-01
		Copper	1.75E+04					5.99E-01	2.39E-02		6.23E-01
		Total					3.7E-05				0.9
	Child Resident	Arsenic	5.77E+01	7.59E-05	7.97E-06	3.62E-08	8.39E-05	1.97E+00	2.07E-01		2.17E+00
		Copper	1.75E+04					5.59E+00	1.57E-01		5.75E+00
		Total					8.4E-05				7.9
	Adult/Child Resident	Arsenic	5.77E+01	1.08E-04	1.28E-05	9.81E-08	1.21E-04				
		Copper	1.75E+04								
		Total					1.2E-04				NA

Notes:
NA = Not applicable

Table A-68
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 7
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-099	1.2E-04	7.0
101-07-104	4.5E-05	4.4
101-07-270	1.2E-04	7.9

Table A-69
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-090
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.84E+01	1.82E-05	1.50E+00	2.73E-05	2.72E-06	1.50E+00	4.08E-06	3.45E-09	1.51E+01	5.20E-08	3.14E-05
Copper	1.61E+04	7.56E-03	NA		3.02E-04	NA		1.15E-06	NA		
Child Resident											
Arsenic	4.84E+01	4.24E-05	1.50E+00	6.36E-05	4.46E-06	1.50E+00	6.68E-06	2.02E-09	1.51E+01	3.03E-08	7.04E-05
Copper	1.61E+04	1.76E-02	NA		4.94E-04	NA		6.70E-07	NA		
Total Adult Resident				2.7E-05			4.1E-06			5.2E-08	3.1E-05
Total Child Resident				6.4E-05			6.7E-06			3.0E-08	7.0E-05
Total Adult/Child Resident		(89.3% Contribution)		9.1E-05	(10.6% Contribution)		1.1E-05	(0.1% Contribution)		8.2E-08	1.0E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-70
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-090
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.84E+01	5.30E-05	3.00E-04	1.77E-01	7.94E-06	3.00E-04	2.65E-02	1.01E-08	NA		2.03E-01
Copper	1.61E+04	2.21E-02	4.00E-02	5.51E-01	8.80E-04	4.00E-02	2.20E-02	3.35E-06	NA		5.73E-01
Child Resident											
Arsenic	4.84E+01	4.95E-04	3.00E-04	1.65E+00	5.20E-05	3.00E-04	1.73E-01	2.35E-08	NA		1.82E+00
Copper	1.61E+04	2.06E-01	4.00E-02	5.15E+00	5.76E-03	4.00E-02	1.44E-01	7.82E-06	NA		5.29E+00
Total Adult Resident				7.3E-01			4.8E-02			0.0E+00	0.78
Total Child Resident			(95.5% Contribution)	6.8E+00		(4.5% Contribution)	3.2E-01		(0% Contribution)	0.0E+00	7.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-71
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-091
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.50E+01	1.69E-05	1.50E+00	2.54E-05	2.53E-06	1.50E+00	3.79E-06	3.21E-09	1.51E+01	4.83E-08	2.92E-05
Copper	2.23E+04	1.05E-02	NA		4.18E-04	NA		1.59E-06	NA		
Child Resident											
Arsenic	4.50E+01	3.95E-05	1.50E+00	5.92E-05	4.14E-06	1.50E+00	6.21E-06	1.87E-09	1.51E+01	2.82E-08	6.54E-05
Copper	2.23E+04	2.44E-02	NA		6.84E-04	NA		9.29E-07	NA		
Total Adult Resident				2.5E-05			3.8E-06			4.8E-08	2.9E-05
Total Child Resident				5.9E-05			6.2E-06			2.8E-08	6.5E-05
Total Adult/Child Resident		(89.3% Contribution)		8.5E-05	(10.6% Contribution)		1.0E-05	(0.1% Contribution)		7.7E-08	9.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-72
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-091
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.50E+01	4.93E-05	3.00E-04	1.64E-01	7.38E-06	3.00E-04	2.46E-02	9.37E-09	NA		1.9E-01
Copper	2.23E+04	3.05E-02	4.00E-02	7.64E-01	1.22E-03	4.00E-02	3.05E-02	4.64E-06	NA		7.9E-01
Child Resident											
Arsenic	4.50E+01	4.60E-04	3.00E-04	1.53E+00	4.83E-05	3.00E-04	1.61E-01	2.19E-08	NA		1.7E+00
Copper	2.23E+04	2.85E-01	4.00E-02	7.13E+00	7.98E-03	4.00E-02	2.00E-01	1.08E-05	NA		7.3E+00
Total Adult Resident				9.3E-01			5.5E-02			0.0E+00	0.98
Total Child Resident			(96% Contribution)	8.7E+00		(4% Contribution)	3.6E-01		(0% Contribution)	0.0E+00	9.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-73
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-092A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.13E+01	1.18E-05	1.50E+00	1.76E-05	1.76E-06	1.50E+00	2.64E-06	2.23E-09	1.51E+01	3.36E-08	2.03E-05
Copper	1.01E+04	4.74E-03	NA		1.89E-04	NA		7.21E-07	NA		
Child Resident											
Arsenic	3.13E+01	2.74E-05	1.50E+00	4.12E-05	2.88E-06	1.50E+00	4.32E-06	1.30E-09	1.51E+01	1.96E-08	4.55E-05
Copper	1.01E+04	1.11E-02	NA		3.10E-04	NA		4.21E-07	NA		
Total Adult Resident				1.8E-05			2.6E-06			3.4E-08	2.0E-05
Total Child Resident				4.1E-05			4.3E-06			2.0E-08	4.6E-05
Total Adult/Child Resident		(89.3% Contribution)		5.9E-05	(10.6% Contribution)		7.0E-06	(0.1% Contribution)		5.3E-08	6.6E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-74
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-092A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.13E+01	3.43E-05	3.00E-04	1.14E-01	5.13E-06	3.00E-04	1.71E-02	6.52E-09	NA		1.3E-01
Copper	1.01E+04	1.38E-02	4.00E-02	3.46E-01	5.52E-04	4.00E-02	1.38E-02	2.10E-06	NA		3.6E-01
Child Resident											
Arsenic	3.13E+01	3.20E-04	3.00E-04	1.07E+00	3.36E-05	3.00E-04	1.12E-01	1.52E-08	NA		1.2E+00
Copper	1.01E+04	1.29E-01	4.00E-02	3.23E+00	3.62E-03	4.00E-02	9.04E-02	4.91E-06	NA		3.3E+00
Total Adult Resident				4.6E-01			3.1E-02			0.0E+00	0.49
Total Child Resident			(95.5% Contribution)	4.3E+00		(4.5% Contribution)	2.0E-01		(0% Contribution)	0.0E+00	4.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-75
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-105
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.36E+01	1.26E-05	1.50E+00	1.89E-05	1.89E-06	1.50E+00	2.83E-06	2.40E-09	1.51E+01	3.61E-08	2.18E-05
Copper	1.71E+04	8.03E-03	NA		3.20E-04	NA		1.22E-06	NA		
Child Resident											
Arsenic	3.36E+01	2.95E-05	1.50E+00	4.42E-05	3.09E-06	1.50E+00	4.64E-06	1.40E-09	1.51E+01	2.11E-08	4.88E-05
Copper	1.71E+04	1.87E-02	NA		5.25E-04	NA		7.12E-07	NA		
Total Adult Resident				1.9E-05			2.8E-06			3.6E-08	2.2E-05
Total Child Resident				4.4E-05			4.6E-06			2.1E-08	4.9E-05
Total Adult/Child Resident		(89.3% Contribution)		6.3E-05	(10.6% Contribution)		7.5E-06	(0.1% Contribution)		5.7E-08	7.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-76
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-105
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.36E+01	3.68E-05	3.00E-04	1.23E-01	5.51E-06	3.00E-04	1.84E-02	7.00E-09	NA		1.4E-01
Copper	1.71E+04	2.34E-02	4.00E-02	5.86E-01	9.35E-04	4.00E-02	2.34E-02	3.56E-06	NA		6.1E-01
Child Resident											
Arsenic	3.36E+01	3.44E-04	3.00E-04	1.15E+00	3.61E-05	3.00E-04	1.20E-01	1.63E-08	NA		1.3E+00
Copper	1.71E+04	2.19E-01	4.00E-02	5.47E+00	6.12E-03	4.00E-02	1.53E-01	8.31E-06	NA		5.6E+00
Total Adult Resident				7.1E-01			4.2E-02			0.0E+00	0.75
Total Child Resident			(96% Contribution)	6.6E+00		(4% Contribution)	2.7E-01		(0% Contribution)	0.0E+00	6.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-77
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-110
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.46E+01	5.49E-06	1.50E+00	8.23E-06	8.21E-07	1.50E+00	1.23E-06	1.04E-09	1.51E+01	1.57E-08	9.48E-06
Copper	5.05E+03	2.37E-03	NA		9.46E-05	NA		3.60E-07	NA		
Child Resident											
Arsenic	1.46E+01	1.28E-05	1.50E+00	1.92E-05	1.34E-06	1.50E+00	2.02E-06	6.08E-10	1.51E+01	9.15E-09	2.12E-05
Copper	5.05E+03	5.53E-03	NA		1.55E-04	NA		2.10E-07	NA		
Total Adult Resident				8.2E-06			1.2E-06			1.6E-08	9.5E-06
Total Child Resident				1.9E-05			2.0E-06			9.1E-09	2.1E-05
Total Adult/Child Resident		(89.3% Contribution)		2.7E-05	(10.6% Contribution)		3.2E-06	(0.1% Contribution)		2.5E-08	3.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-78
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 8 - Property 101-07-110
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 8, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.46E+01	1.60E-05	3.00E-04	5.33E-02	2.39E-06	3.00E-04	7.98E-03	3.04E-09	NA		6.1E-02
Copper	5.05E+03	6.92E-03	4.00E-02	1.73E-01	2.76E-04	4.00E-02	6.90E-03	1.05E-06	NA		1.8E-01
Child Resident											
Arsenic	1.46E+01	1.49E-04	3.00E-04	4.98E-01	1.57E-05	3.00E-04	5.23E-02	7.09E-09	NA		5.5E-01
Copper	5.05E+03	6.46E-02	4.00E-02	1.61E+00	1.81E-03	4.00E-02	4.52E-02	2.45E-06	NA		1.7E+00
Total Adult Resident				2.3E-01			1.5E-02			0.0E+00	0.24
Total Child Resident			(95.6% Contribution)	2.1E+00		(4.4% Contribution)	9.7E-02		(0% Contribution)	0.0E+00	2.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-79
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 8
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-090	**Adult Resident**	Arsenic	4.84E+01	2.73E-05	4.08E-06	5.20E-08	3.14E-05	1.77E-01	2.65E-02		2.03E-01
		Copper	1.61E+04					5.51E-01	2.20E-02		5.73E-01
		Total					3.1E-05				0.8
	Child Resident	Arsenic	4.84E+01	6.36E-05	6.68E-06	3.03E-08	7.04E-05	1.65E+00	1.73E-01		1.82E+00
		Copper	1.61E+04					5.15E+00	1.44E-01		5.29E+00
		Total					7.0E-05				7.1
	Adult/Child Resident	Arsenic	4.84E+01	9.09E-05	1.08E-05	8.23E-08	1.02E-04				
		Copper	1.61E+04								
		Total					1.0E-04				NA
101-07-091	**Adult Resident**	Arsenic	4.50E+01	2.54E-05	3.79E-06	4.83E-08	2.92E-05	1.64E-01	2.46E-02		1.89E-01
		Copper	2.23E+04					7.64E-01	3.05E-02		7.94E-01
		Total					2.9E-05				1.0
	Child Resident	Arsenic	4.50E+01	5.92E-05	6.21E-06	2.82E-08	6.54E-05	1.53E+00	1.61E-01		1.70E+00
		Copper	2.23E+04					7.13E+00	2.00E-01		7.33E+00
		Total					6.5E-05				9.0
	Adult/Child Resident	Arsenic	4.50E+01	8.45E-05	1.00E-05	7.65E-08	9.46E-05				
		Copper	2.23E+04								
		Total					9.5E-05				NA
101-07-092A	**Adult Resident**	Arsenic	3.13E+01	1.76E-05	2.64E-06	3.36E-08	2.03E-05	1.14E-01	1.71E-02		1.31E-01
		Copper	1.01E+04					3.46E-01	1.38E-02		3.60E-01
		Total					2.0E-05				0.5
	Child Resident	Arsenic	3.13E+01	4.12E-05	4.32E-06	1.96E-08	4.55E-05	1.07E+00	1.12E-01		1.18E+00
		Copper	1.01E+04					3.23E+00	9.04E-02		3.32E+00
		Total					4.6E-05				4.5
	Adult/Child Resident	Arsenic	3.13E+01	5.88E-05	6.96E-06	5.32E-08	6.58E-05				
		Copper	1.01E+04								
		Total					6.6E-05				NA

Table A-79
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 8
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-105	**Adult Resident**	Arsenic	3.36E+01	1.89E-05	2.83E-06	3.61E-08	2.18E-05	1.23E-01	1.84E-02		1.41E-01
		Copper	1.71E+04					5.86E-01	2.34E-02		6.09E-01
		Total					2.2E-05				0.8
	Child Resident	Arsenic	3.36E+01	4.42E-05	4.64E-06	2.11E-08	4.88E-05	1.15E+00	1.20E-01		1.27E+00
		Copper	1.71E+04					5.47E+00	1.53E-01		5.62E+00
		Total					4.9E-05				6.9
	Adult/Child Resident	Arsenic	3.36E+01	6.31E-05	7.47E-06	5.71E-08	7.07E-05				
		Copper	1.71E+04								
		Total					7.1E-05				NA
101-07-110	**Adult Resident**	Arsenic	1.46E+01	8.23E-06	1.23E-06	1.57E-08	9.48E-06	5.33E-02	7.98E-03		6.13E-02
		Copper	5.05E+03					1.73E-01	6.90E-03		1.80E-01
		Total					9.5E-06				0.2
	Child Resident	Arsenic	1.46E+01	1.92E-05	2.02E-06	9.15E-09	2.12E-05	4.98E-01	5.23E-02		5.50E-01
		Copper	5.05E+03					1.61E+00	4.52E-02		1.66E+00
		Total					2.1E-05				2.2
	Adult/Child Resident	Arsenic	1.46E+01	2.74E-05	3.25E-06	2.48E-08	3.07E-05				
		Copper	5.05E+03								
		Total					3.1E-05				NA

Notes:
NA = Not applicable

Table A-80
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 8
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-090	1.0E-04	7.1
101-07-091	9.5E-05	9.0
101-07-092A	6.6E-05	4.5
101-07-105	7.1E-05	6.9
101-07-110	3.1E-05	2.2

Table A-81
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-035AN
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.57E+01	2.09E-05	1.50E+00	3.14E-05	3.13E-06	1.50E+00	4.70E-06	3.98E-09	1.51E+01	5.98E-08	3.61E-05
Copper	1.79E+04	8.41E-03	NA		3.35E-04	NA		1.28E-06	NA		
Child Resident											
Arsenic	5.57E+01	4.88E-05	1.50E+00	7.32E-05	5.13E-06	1.50E+00	7.69E-06	2.32E-09	1.51E+01	3.49E-08	8.10E-05
Copper	1.79E+04	1.96E-02	NA		5.49E-04	NA		7.45E-07	NA		
Total Adult Resident				3.1E-05			4.7E-06			6.0E-08	3.6E-05
Total Child Resident				7.3E-05			7.7E-06			3.5E-08	8.1E-05
Total Adult/Child Resident		(89.3% Contribution)		1.0E-04	(10.6% Contribution)		1.2E-05	(0.1% Contribution)		9.5E-08	1.2E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-82
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-035AN
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.57E+01	6.10E-05	3.00E-04	2.03E-01	9.13E-06	3.00E-04	3.04E-02	1.16E-08	NA		2.34E-01
Copper	1.79E+04	2.45E-02	4.00E-02	6.13E-01	9.78E-04	4.00E-02	2.45E-02	3.73E-06	NA		6.37E-01
Child Resident											
Arsenic	5.57E+01	5.70E-04	3.00E-04	1.90E+00	5.98E-05	3.00E-04	1.99E-01	2.71E-08	NA		2.10E+00
Copper	1.79E+04	2.29E-01	4.00E-02	5.72E+00	6.41E-03	4.00E-02	1.60E-01	8.70E-06	NA		5.88E+00
Total Adult Resident				8.2E-01			5.5E-02			0.0E+00	0.87
Total Child Resident			(95.5% Contribution)	7.6E+00		(4.5% Contribution)	3.6E-01		(0% Contribution)	0.0E+00	8.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-83
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-037
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.61E+01	2.11E-05	1.50E+00	3.16E-05	3.15E-06	1.50E+00	4.73E-06	4.00E-09	1.51E+01	6.03E-08	3.64E-05
Copper	1.65E+04	7.75E-03	NA		3.09E-04	NA		1.18E-06	NA		
Child Resident											
Arsenic	5.61E+01	4.92E-05	1.50E+00	7.38E-05	5.16E-06	1.50E+00	7.75E-06	2.34E-09	1.51E+01	3.52E-08	8.16E-05
Copper	1.65E+04	1.81E-02	NA		5.06E-04	NA		6.87E-07	NA		
Total Adult Resident				3.2E-05			4.7E-06			6.0E-08	3.6E-05
Total Child Resident				7.4E-05			7.7E-06			3.5E-08	8.2E-05
Total Adult/Child Resident		(89.3% Contribution)		1.1E-04	(10.6% Contribution)		1.2E-05	(0.1% Contribution)		9.5E-08	1.2E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-84
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-037
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.61E+01	6.15E-05	3.00E-04	2.05E-01	9.20E-06	3.00E-04	3.07E-02	1.17E-08	NA		2.4E-01
Copper	1.65E+04	2.26E-02	4.00E-02	5.65E-01	9.02E-04	4.00E-02	2.25E-02	3.44E-06	NA		5.9E-01
Child Resident											
Arsenic	5.61E+01	5.74E-04	3.00E-04	1.91E+00	6.02E-05	3.00E-04	2.01E-01	2.73E-08	NA		2.1E+00
Copper	1.65E+04	2.11E-01	4.00E-02	5.27E+00	5.91E-03	4.00E-02	1.48E-01	8.02E-06	NA		5.4E+00
Total Adult Resident				7.7E-01			5.3E-02			0.0E+00	0.82
Total Child Resident			(95.4% Contribution)	7.2E+00		(4.6% Contribution)	3.5E-01		(0% Contribution)	0.0E+00	7.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-85
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-040
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.45E+01	2.05E-05	1.50E+00	3.07E-05	3.06E-06	1.50E+00	4.60E-06	3.89E-09	1.51E+01	5.85E-08	3.54E-05
Copper	2.34E+04	1.10E-02	NA		4.39E-04	NA		1.67E-06	NA		
Child Resident											
Arsenic	5.45E+01	4.78E-05	1.50E+00	7.17E-05	5.02E-06	1.50E+00	7.53E-06	2.27E-09	1.51E+01	3.42E-08	7.92E-05
Copper	2.34E+04	2.56E-02	NA		7.18E-04	NA		9.74E-07	NA		
Total Adult Resident				3.1E-05			4.6E-06			5.9E-08	3.5E-05
Total Child Resident				7.2E-05			7.5E-06			3.4E-08	7.9E-05
Total Adult/Child Resident		(89.3% Contribution)		1.0E-04	(10.6% Contribution)		1.2E-05	(0.1% Contribution)		9.3E-08	1.1E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-86
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-040
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.45E+01	5.97E-05	3.00E-04	1.99E-01	8.94E-06	3.00E-04	2.98E-02	1.13E-08	NA		2.3E-01
Copper	2.34E+04	3.21E-02	4.00E-02	8.01E-01	1.28E-03	4.00E-02	3.20E-02	4.87E-06	NA		8.3E-01
Child Resident											
Arsenic	5.45E+01	5.57E-04	3.00E-04	1.86E+00	5.85E-05	3.00E-04	1.95E-01	2.65E-08	NA		2.1E+00
Copper	2.34E+04	2.99E-01	4.00E-02	7.48E+00	8.38E-03	4.00E-02	2.09E-01	1.14E-05	NA		7.7E+00
Total Adult Resident				1.0E+00			6.2E-02			0.0E+00	1.06
Total Child Resident			(95.8% Contribution)	9.3E+00		(4.2% Contribution)	4.0E-01		(0% Contribution)	0.0E+00	9.7

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-87
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-052
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.66E+01	1.38E-05	1.50E+00	2.06E-05	2.06E-06	1.50E+00	3.09E-06	2.61E-09	1.51E+01	3.93E-08	2.38E-05
Copper	1.14E+04	5.35E-03	NA		2.14E-04	NA		8.14E-07	NA		
Child Resident											
Arsenic	3.66E+01	3.21E-05	1.50E+00	4.81E-05	3.37E-06	1.50E+00	5.05E-06	1.52E-09	1.51E+01	2.29E-08	5.32E-05
Copper	1.14E+04	1.25E-02	NA		3.50E-04	NA		4.75E-07	NA		
Total Adult Resident				2.1E-05			3.1E-06			3.9E-08	2.4E-05
Total Child Resident				4.8E-05			5.1E-06			2.3E-08	5.3E-05
Total Adult/Child Resident		(89.3% Contribution)		6.9E-05	(10.6% Contribution)		8.1E-06	(0.1% Contribution)		6.2E-08	7.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-88
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-052
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.66E+01	4.01E-05	3.00E-04	1.34E-01	6.00E-06	3.00E-04	2.00E-02	7.62E-09	NA		1.5E-01
Copper	1.14E+04	1.56E-02	4.00E-02	3.90E-01	6.23E-04	4.00E-02	1.56E-02	2.37E-06	NA		4.1E-01
Child Resident											
Arsenic	3.66E+01	3.74E-04	3.00E-04	1.25E+00	3.93E-05	3.00E-04	1.31E-01	1.78E-08	NA		1.4E+00
Copper	1.14E+04	1.46E-01	4.00E-02	3.64E+00	4.08E-03	4.00E-02	1.02E-01	5.54E-06	NA		3.7E+00
Total Adult Resident				5.2E-01			3.6E-02			0.0E+00	0.56
Total Child Resident			(95.5% Contribution)	4.9E+00		(4.5% Contribution)	2.3E-01		(0% Contribution)	0.0E+00	5.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-89
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-060
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.23E+01	8.38E-06	1.50E+00	1.26E-05	1.25E-06	1.50E+00	1.88E-06	1.59E-09	1.51E+01	2.40E-08	1.45E-05
Copper	6.58E+03	3.09E-03	NA		1.23E-04	NA		4.70E-07	NA		
Child Resident											
Arsenic	2.23E+01	1.96E-05	1.50E+00	2.93E-05	2.05E-06	1.50E+00	3.08E-06	9.29E-10	1.51E+01	1.40E-08	3.24E-05
Copper	6.58E+03	7.21E-03	NA		2.02E-04	NA		2.74E-07	NA		
Total Adult Resident				1.3E-05			1.9E-06			2.4E-08	1.4E-05
Total Child Resident				2.9E-05			3.1E-06			1.4E-08	3.2E-05
Total Adult/Child Resident		(89.3% Contribution)		4.2E-05	(10.6% Contribution)		5.0E-06	(0.1% Contribution)		3.8E-08	4.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-90
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-060
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.23E+01	2.44E-05	3.00E-04	8.15E-02	3.66E-06	3.00E-04	1.22E-02	4.64E-09	NA		9.4E-02
Copper	6.58E+03	9.01E-03	4.00E-02	2.25E-01	3.60E-04	4.00E-02	8.99E-03	1.37E-06	NA		2.3E-01
Child Resident											
Arsenic	2.23E+01	2.28E-04	3.00E-04	7.60E-01	2.39E-05	3.00E-04	7.98E-02	1.08E-08	NA		8.4E-01
Copper	6.58E+03	8.41E-02	4.00E-02	2.10E+00	2.36E-03	4.00E-02	5.89E-02	3.20E-06	NA		2.2E+00
Total Adult Resident				3.1E-01			2.1E-02			0.0E+00	0.33
Total Child Resident			(95.4% Contribution)	2.9E+00		(4.6% Contribution)	1.4E-01		(0% Contribution)	0.0E+00	3.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-91
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-061
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.76E+01	1.04E-05	1.50E+00	1.56E-05	1.55E-06	1.50E+00	2.33E-06	1.97E-09	1.51E+01	2.96E-08	1.79E-05
Copper	5.68E+03	2.67E-03	NA		1.06E-04	NA		4.05E-07	NA		
Child Resident											
Arsenic	2.76E+01	2.42E-05	1.50E+00	3.63E-05	2.54E-06	1.50E+00	3.81E-06	1.15E-09	1.51E+01	1.73E-08	4.01E-05
Copper	5.68E+03	6.22E-03	NA		1.74E-04	NA		2.36E-07	NA		
Total Adult Resident				1.6E-05			2.3E-06			3.0E-08	1.8E-05
Total Child Resident				3.6E-05			3.8E-06			1.7E-08	4.0E-05
Total Adult/Child Resident		(89.3% Contribution)		5.2E-05	(10.6% Contribution)		6.1E-06	(0.1% Contribution)		4.7E-08	5.8E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-92
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-061
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.76E+01	3.02E-05	3.00E-04	1.01E-01	4.53E-06	3.00E-04	1.51E-02	5.75E-09	NA		1.2E-01
Copper	5.68E+03	7.78E-03	4.00E-02	1.95E-01	3.10E-04	4.00E-02	7.76E-03	1.18E-06	NA		2.0E-01
Child Resident											
Arsenic	2.76E+01	2.82E-04	3.00E-04	9.41E-01	2.96E-05	3.00E-04	9.88E-02	1.34E-08	NA		1.0E+00
Copper	5.68E+03	7.26E-02	4.00E-02	1.82E+00	2.03E-03	4.00E-02	5.08E-02	2.76E-06	NA		1.9E+00
Total Adult Resident				3.0E-01			2.3E-02			0.0E+00	0.32
Total Child Resident			(94.9% Contribution)	2.8E+00		(5.1% Contribution)	1.5E-01		(0% Contribution)	0.0E+00	2.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-93
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-062
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.34E+01	1.63E-05	1.50E+00	2.45E-05	2.44E-06	1.50E+00	3.66E-06	3.10E-09	1.51E+01	4.66E-08	2.82E-05
Copper	8.86E+03	4.16E-03	NA		1.66E-04	NA		6.32E-07	NA		
Child Resident											
Arsenic	4.34E+01	3.80E-05	1.50E+00	5.71E-05	4.00E-06	1.50E+00	5.99E-06	1.81E-09	1.51E+01	2.72E-08	6.31E-05
Copper	8.86E+03	9.71E-03	NA		2.72E-04	NA		3.69E-07	NA		
Total Adult Resident				2.4E-05			3.7E-06			4.7E-08	2.8E-05
Total Child Resident				5.7E-05			6.0E-06			2.7E-08	6.3E-05
Total Adult/Child Resident		(89.3% Contribution)		8.2E-05	(10.6% Contribution)		9.7E-06	(0.1% Contribution)		7.4E-08	9.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-94
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-062
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.34E+01	4.76E-05	3.00E-04	1.59E-01	7.12E-06	3.00E-04	2.37E-02	9.04E-09	NA		1.8E-01
Copper	8.86E+03	1.21E-02	4.00E-02	3.03E-01	4.84E-04	4.00E-02	1.21E-02	1.84E-06	NA		3.2E-01
Child Resident											
Arsenic	4.34E+01	4.44E-04	3.00E-04	1.48E+00	4.66E-05	3.00E-04	1.55E-01	2.11E-08	NA		1.6E+00
Copper	8.86E+03	1.13E-01	4.00E-02	2.83E+00	3.17E-03	4.00E-02	7.93E-02	4.30E-06	NA		2.9E+00
Total Adult Resident				4.6E-01			3.6E-02			0.0E+00	0.50
Total Child Resident			(94.8% Contribution)	4.3E+00		(5.2% Contribution)	2.3E-01		(0% Contribution)	0.0E+00	4.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-95
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089K
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	8.72E+01	3.28E-05	1.50E+00	4.91E-05	4.90E-06	1.50E+00	7.35E-06	6.22E-09	1.51E+01	9.37E-08	5.66E-05
Copper	1.09E+04	5.12E-03	NA		2.04E-04	NA		7.78E-07	NA		
Child Resident											
Arsenic	8.72E+01	7.64E-05	1.50E+00	1.15E-04	8.03E-06	1.50E+00	1.20E-05	3.63E-09	1.51E+01	5.46E-08	1.27E-04
Copper	1.09E+04	1.19E-02	NA		3.34E-04	NA		4.54E-07	NA		
Total Adult Resident				4.9E-05			7.4E-06			9.4E-08	5.7E-05
Total Child Resident				1.1E-04			1.2E-05			5.5E-08	1.3E-04
Total Adult/Child Resident		(89.3% Contribution)		1.6E-04	(10.6% Contribution)		1.9E-05	(0.1% Contribution)		1.5E-07	1.8E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-96
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089K
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	8.72E+01	9.56E-05	3.00E-04	3.19E-01	1.43E-05	3.00E-04	4.77E-02	1.82E-08	NA		3.7E-01
Copper	1.09E+04	1.49E-02	4.00E-02	3.73E-01	5.96E-04	4.00E-02	1.49E-02	2.27E-06	NA		3.9E-01
Child Resident											
Arsenic	8.72E+01	8.92E-04	3.00E-04	2.97E+00	9.37E-05	3.00E-04	3.12E-01	4.24E-08	NA		3.3E+00
Copper	1.09E+04	1.39E-01	4.00E-02	3.48E+00	3.90E-03	4.00E-02	9.76E-02	5.29E-06	NA		3.6E+00
Total Adult Resident				6.9E-01			6.3E-02			0.0E+00	0.75
Total Child Resident			(94% Contribution)	6.5E+00		(6% Contribution)	4.1E-01		(0% Contribution)	0.0E+00	6.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-97
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089Q
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.77E+01	1.42E-05	1.50E+00	2.12E-05	2.12E-06	1.50E+00	3.18E-06	2.69E-09	1.51E+01	4.05E-08	2.45E-05
Copper	2.21E+04	1.04E-02	NA		4.14E-04	NA		1.58E-06	NA		
Child Resident											
Arsenic	3.77E+01	3.31E-05	1.50E+00	4.96E-05	3.47E-06	1.50E+00	5.21E-06	1.57E-09	1.51E+01	2.36E-08	5.48E-05
Copper	2.21E+04	2.42E-02	NA		6.78E-04	NA		9.20E-07	NA		
Total Adult Resident				2.1E-05			3.2E-06			4.0E-08	2.4E-05
Total Child Resident				5.0E-05			5.2E-06			2.4E-08	5.5E-05
Total Adult/Child Resident		(89.3% Contribution)		7.1E-05	(10.6% Contribution)		8.4E-06	(0.1% Contribution)		6.4E-08	7.9E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-98
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089Q
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.77E+01	4.13E-05	3.00E-04	1.38E-01	6.18E-06	3.00E-04	2.06E-02	7.85E-09	NA		1.6E-01
Copper	2.21E+04	3.03E-02	4.00E-02	7.57E-01	1.21E-03	4.00E-02	3.02E-02	4.60E-06	NA		7.9E-01
Child Resident											
Arsenic	3.77E+01	3.86E-04	3.00E-04	1.29E+00	4.05E-05	3.00E-04	1.35E-01	1.83E-08	NA		1.4E+00
Copper	2.21E+04	2.83E-01	4.00E-02	7.06E+00	7.91E-03	4.00E-02	1.98E-01	1.07E-05	NA		7.3E+00
Total Adult Resident				8.9E-01			5.1E-02			0.0E+00	0.95
Total Child Resident			(96.2% Contribution)	8.3E+00		(3.8% Contribution)	3.3E-01		(0% Contribution)	0.0E+00	8.7

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-99
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089S
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.65E+01	2.50E-05	1.50E+00	3.75E-05	3.74E-06	1.50E+00	5.61E-06	4.75E-09	1.51E+01	7.14E-08	4.32E-05
Copper	2.06E+04	9.68E-03	NA		3.86E-04	NA		1.47E-06	NA		
Child Resident											
Arsenic	6.65E+01	5.83E-05	1.50E+00	8.75E-05	6.12E-06	1.50E+00	9.18E-06	2.77E-09	1.51E+01	4.17E-08	9.67E-05
Copper	2.06E+04	2.26E-02	NA		6.32E-04	NA		8.58E-07	NA		
Total Adult Resident				3.7E-05			5.6E-06			7.1E-08	4.3E-05
Total Child Resident				8.7E-05			9.2E-06			4.2E-08	9.7E-05
Total Adult/Child Resident		(89.3% Contribution)		1.2E-04	(10.6% Contribution)		1.5E-05	(0.1% Contribution)		1.1E-07	1.4E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-100
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089S
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.65E+01	7.29E-05	3.00E-04	2.43E-01	1.09E-05	3.00E-04	3.63E-02	1.38E-08	NA		2.8E-01
Copper	2.06E+04	2.82E-02	4.00E-02	7.05E-01	1.13E-03	4.00E-02	2.81E-02	4.29E-06	NA		7.3E-01
Child Resident											
Arsenic	6.65E+01	6.80E-04	3.00E-04	2.27E+00	7.14E-05	3.00E-04	2.38E-01	3.23E-08	NA		2.5E+00
Copper	2.06E+04	2.63E-01	4.00E-02	6.58E+00	7.37E-03	4.00E-02	1.84E-01	1.00E-05	NA		6.8E+00
Total Adult Resident				9.5E-01			6.4E-02			0.0E+00	1.01
Total Child Resident			(95.4% Contribution)	8.9E+00		(4.6% Contribution)	4.2E-01		(0% Contribution)	0.0E+00	9.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-101
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089T
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.40E+02	2.03E-04	1.50E+00	3.04E-04	3.04E-05	1.50E+00	4.55E-05	3.85E-08	1.51E+01	5.80E-07	3.50E-04
Copper	1.95E+04	9.16E-03	NA		3.65E-04	NA		1.39E-06	NA		
Child Resident											
Arsenic	5.40E+02	4.73E-04	1.50E+00	7.10E-04	4.97E-05	1.50E+00	7.46E-05	2.25E-08	1.51E+01	3.38E-07	7.85E-04
Copper	1.95E+04	2.14E-02	NA		5.98E-04	NA		8.12E-07	NA		
Total Adult Resident				3.0E-04			4.6E-05			5.8E-07	3.5E-04
Total Child Resident				7.1E-04			7.5E-05			3.4E-07	7.9E-04
Total Adult/Child Resident		(89.3% Contribution)		1.0E-03	(10.6% Contribution)		1.2E-04	(0.1% Contribution)		9.2E-07	1.1E-03

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.
The EPC Value for arsenic is based on 9 surface soil samples. The maximum arsenic concentration is 865 mg/kg. The range of the other 8 arsenic concentrations is 32 mg/kg to 98.5 mg/kg.
The 95% UCL (EPC) is 540 mg/kg.

Table A-102
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089T
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.40E+02	5.92E-04	3.00E-04	1.97E+00	8.85E-05	3.00E-04	2.95E-01	1.12E-07	NA		2.3E+00
Copper	1.95E+04	2.67E-02	4.00E-02	6.68E-01	1.07E-03	4.00E-02	2.66E-02	4.06E-06	NA		6.9E-01
Child Resident											
Arsenic	5.40E+02	5.52E-03	3.00E-04	1.84E+01	5.80E-04	3.00E-04	1.93E+00	2.62E-07	NA		2.0E+01
Copper	1.95E+04	2.49E-01	4.00E-02	6.23E+00	6.98E-03	4.00E-02	1.75E-01	9.47E-06	NA		6.4E+00
Total Adult Resident				2.6E+00			3.2E-01			0.0E+00	2.96
Total Child Resident			(92.1% Contribution)	2.5E+01		(7.9% Contribution)	2.1E+00		(0% Contribution)	0.0E+00	26.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-103
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089U
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.02E+01	1.89E-05	1.50E+00	2.83E-05	2.82E-06	1.50E+00	4.23E-06	3.58E-09	1.51E+01	5.39E-08	3.26E-05
Copper	1.73E+04	8.13E-03	NA		3.24E-04	NA		1.23E-06	NA		
Child Resident											
Arsenic	5.02E+01	4.40E-05	1.50E+00	6.60E-05	4.62E-06	1.50E+00	6.93E-06	2.09E-09	1.51E+01	3.15E-08	7.30E-05
Copper	1.73E+04	1.90E-02	NA		5.31E-04	NA		7.20E-07	NA		
Total Adult Resident				2.8E-05			4.2E-06			5.4E-08	3.3E-05
Total Child Resident				6.6E-05			6.9E-06			3.1E-08	7.3E-05
Total Adult/Child Resident		(89.3% Contribution)		9.4E-05	(10.6% Contribution)		1.1E-05	(0.1% Contribution)		8.5E-08	1.1E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-104
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 9 - Property 101-07-089U
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 9, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.02E+01	5.50E-05	3.00E-04	1.83E-01	8.23E-06	3.00E-04	2.74E-02	1.05E-08	NA		2.1E-01
Copper	1.73E+04	2.37E-02	4.00E-02	5.92E-01	9.46E-04	4.00E-02	2.36E-02	3.60E-06	NA		6.2E-01
Child Resident											
Arsenic	5.02E+01	5.13E-04	3.00E-04	1.71E+00	5.39E-05	3.00E-04	1.80E-01	2.44E-08	NA		1.9E+00
Copper	1.73E+04	2.21E-01	4.00E-02	5.53E+00	6.19E-03	4.00E-02	1.55E-01	8.40E-06	NA		5.7E+00
Total Adult Resident				7.8E-01			5.1E-02			0.0E+00	0.83
Total Child Resident			(95.6% Contribution)	7.2E+00		(4.4% Contribution)	3.3E-01		(0% Contribution)	0.0E+00	7.6

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-105
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 9
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-035AN	**Adult Resident**	Arsenic	5.57E+01	3.14E-05	4.70E-06	5.98E-08	3.61E-05	2.03E-01	3.04E-02		2.34E-01
		Copper	1.79E+04					6.13E-01	2.45E-02		6.37E-01
		Total					3.6E-05				0.9
	Child Resident	Arsenic	5.57E+01	7.32E-05	7.69E-06	3.49E-08	8.10E-05	1.90E+00	1.99E-01		2.10E+00
		Copper	1.79E+04					5.72E+00	1.60E-01		5.88E+00
		Total					8.1E-05				8.0
	Adult/Child Resident	Arsenic	5.57E+01	1.05E-04	1.24E-05	9.47E-08	1.17E-04				
		Copper	1.79E+04								
		Total					1.2E-04				NA
101-07-037	**Adult Resident**	Arsenic	5.61E+01	3.16E-05	4.73E-06	6.03E-08	3.64E-05	2.05E-01	3.07E-02		2.36E-01
		Copper	1.65E+04					5.65E-01	2.25E-02		5.88E-01
		Total					3.6E-05				0.8
	Child Resident	Arsenic	5.61E+01	7.38E-05	7.75E-06	3.52E-08	8.16E-05	1.91E+00	2.01E-01		2.11E+00
		Copper	1.65E+04					5.27E+00	1.48E-01		5.42E+00
		Total					8.2E-05				7.5
	Adult/Child Resident	Arsenic	5.61E+01	1.05E-04	1.25E-05	9.54E-08	1.18E-04				
		Copper	1.65E+04								
		Total					1.2E-04				NA
101-07-040	**Adult Resident**	Arsenic	5.45E+01	3.07E-05	4.60E-06	5.85E-08	3.54E-05	1.99E-01	2.98E-02		2.29E-01
		Copper	2.34E+04					8.01E-01	3.20E-02		8.33E-01
		Total					3.5E-05				1.1
	Child Resident	Arsenic	5.45E+01	7.17E-05	7.53E-06	3.42E-08	7.92E-05	1.86E+00	1.95E-01		2.05E+00
		Copper	2.34E+04					7.48E+00	2.09E-01		7.69E+00
		Total					7.9E-05				9.7
	Adult/Child Resident	Arsenic	5.45E+01	1.02E-04	1.21E-05	9.27E-08	1.15E-04				
		Copper	2.34E+04								
		Total					1.1E-04				NA

Table A-105
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 9
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-052	**Adult Resident**	Arsenic	3.66E+01	2.06E-05	3.09E-06	3.93E-08	2.38E-05	1.34E-01	2.00E-02		1.54E-01
		Copper	1.14E+04					3.90E-01	1.56E-02		4.06E-01
		Total					2.4E-05				0.6
	Child Resident	Arsenic	3.66E+01	4.81E-05	5.05E-06	2.29E-08	5.32E-05	1.25E+00	1.31E-01		1.38E+00
		Copper	1.14E+04					3.64E+00	1.02E-01		3.75E+00
		Total					5.3E-05				5.1
	Adult/Child Resident	Arsenic	3.66E+01	6.88E-05	8.14E-06	6.23E-08	7.70E-05				
		Copper	1.14E+04								
		Total					7.7E-05				NA
101-07-060	**Adult Resident**	Arsenic	2.23E+01	1.26E-05	1.88E-06	2.40E-08	1.45E-05	8.15E-02	1.22E-02		9.36E-02
		Copper	6.58E+03					2.25E-01	8.99E-03		2.34E-01
		Total					1.4E-05				0.3
	Child Resident	Arsenic	2.23E+01	2.93E-05	3.08E-06	1.40E-08	3.24E-05	7.60E-01	7.98E-02		8.40E-01
		Copper	6.58E+03					2.10E+00	5.89E-02		2.16E+00
		Total					3.2E-05				3.0
	Adult/Child Resident	Arsenic	2.23E+01	4.19E-05	4.96E-06	3.79E-08	4.69E-05				
		Copper	6.58E+03								
		Total					4.7E-05				NA
101-07-061	**Adult Resident**	Arsenic	2.76E+01	1.56E-05	2.33E-06	2.96E-08	1.79E-05	1.01E-01	1.51E-02		1.16E-01
		Copper	5.68E+03					1.95E-01	7.76E-03		2.02E-01
		Total					1.8E-05				0.3
	Child Resident	Arsenic	2.76E+01	3.63E-05	3.81E-06	1.73E-08	4.01E-05	9.41E-01	9.88E-02		1.04E+00
		Copper	5.68E+03					1.82E+00	5.08E-02		1.87E+00
		Total					4.0E-05				2.9
	Adult/Child Resident	Arsenic	2.76E+01	5.19E-05	6.14E-06	4.69E-08	5.80E-05				
		Copper	5.68E+03								
		Total					5.8E-05				NA

Table A-105
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 9
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-062	**Adult Resident**	Arsenic	4.34E+01	2.45E-05	3.66E-06	4.66E-08	2.82E-05	1.59E-01	2.37E-02		1.82E-01
		Copper	8.86E+03					3.03E-01	1.21E-02		3.16E-01
		Total					2.8E-05				0.5
	Child Resident	Arsenic	4.34E+01	5.71E-05	5.99E-06	2.72E-08	6.31E-05	1.48E+00	1.55E-01		1.64E+00
		Copper	8.86E+03					2.83E+00	7.93E-02		2.91E+00
		Total					6.3E-05				4.5
	Adult/Child Resident	Arsenic	4.34E+01	8.15E-05	9.65E-06	7.38E-08	9.13E-05				
		Copper	8.86E+03								
		Total					9.1E-05				NA
101-07-089K	**Adult Resident**	Arsenic	8.72E+01	4.91E-05	7.35E-06	9.37E-08	5.66E-05	3.19E-01	4.77E-02		3.66E-01
		Copper	1.09E+04					3.73E-01	1.49E-02		3.88E-01
		Total					5.7E-05				0.8
	Child Resident	Arsenic	8.72E+01	1.15E-04	1.20E-05	5.46E-08	1.27E-04	2.97E+00	3.12E-01		3.29E+00
		Copper	1.09E+04					3.48E+00	9.76E-02		3.58E+00
		Total					1.3E-04				6.9
	Adult/Child Resident	Arsenic	8.72E+01	1.64E-04	1.94E-05	1.48E-07	1.83E-04				
		Copper	1.09E+04								
		Total					1.8E-04				NA
101-07-089Q	**Adult Resident**	Arsenic	3.77E+01	2.12E-05	3.18E-06	4.05E-08	2.45E-05	1.38E-01	2.06E-02		1.58E-01
		Copper	2.21E+04					7.57E-01	3.02E-02		7.87E-01
		Total					2.4E-05				0.9
	Child Resident	Arsenic	3.77E+01	4.96E-05	5.21E-06	2.36E-08	5.48E-05	1.29E+00	1.35E-01		1.42E+00
		Copper	2.21E+04					7.06E+00	1.98E-01		7.26E+00
		Total					5.5E-05				8.7
	Adult/Child Resident	Arsenic	3.77E+01	7.08E-05	8.38E-06	6.41E-08	7.93E-05				
		Copper	2.21E+04								
		Total					7.9E-05				NA

Table A-105
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 9
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-089S	**Adult Resident**	Arsenic	6.65E+01	3.75E-05	5.61E-06	7.14E-08	4.32E-05	2.43E-01	3.63E-02		2.79E-01
		Copper	2.06E+04					7.05E-01	2.81E-02		7.34E-01
		Total					4.3E-05				1.0
	Child Resident	Arsenic	6.65E+01	8.75E-05	9.18E-06	4.17E-08	9.67E-05	2.27E+00	2.38E-01		2.51E+00
		Copper	2.06E+04					6.58E+00	1.84E-01		6.77E+00
		Total					9.7E-05				9.3
	Adult/Child Resident	Arsenic	6.65E+01	1.25E-04	1.48E-05	1.13E-07	1.40E-04				
		Copper	2.06E+04								
		Total					1.4E-04				NA
101-07-089T	**Adult Resident**	Arsenic	5.40E+02	3.04E-04	4.55E-05	5.80E-07	3.50E-04	1.97E+00	2.95E-01		2.27E+00
		Copper	1.95E+04					6.68E-01	2.66E-02		6.94E-01
		Total					3.5E-04				3.0
	Child Resident	Arsenic	5.40E+02	7.10E-04	7.46E-05	3.38E-07	7.85E-04	1.84E+01	1.93E+00		2.03E+01
		Copper	1.95E+04					6.23E+00	1.75E-01		6.41E+00
		Total					7.9E-04				26.8
	Adult/Child Resident	Arsenic	5.40E+02	1.01E-03	1.20E-04	9.18E-07	1.14E-03				
		Copper	1.95E+04								
		Total					1.1E-03				NA
101-07-089U	**Adult Resident**	Arsenic	5.02E+01	2.83E-05	4.23E-06	5.39E-08	3.26E-05	1.83E-01	2.74E-02		2.11E-01
		Copper	1.73E+04					5.92E-01	2.36E-02		6.16E-01
		Total					3.3E-05				0.8
	Child Resident	Arsenic	5.02E+01	6.60E-05	6.93E-06	3.15E-08	7.30E-05	1.71E+00	1.80E-01		1.89E+00
		Copper	1.73E+04					5.53E+00	1.55E-01		5.68E+00
		Total					7.3E-05				7.6
	Adult/Child Resident	Arsenic	5.02E+01	9.43E-05	1.12E-05	8.54E-08	1.06E-04				
		Copper	1.73E+04								
		Total					1.1E-04				NA

Notes:
NA = Not applicable
The EPC Value for arsenic at Property 101-07-089T is based on 9 surface soil samples. The maximum arsenic concentration is 865 mg/kg.
The range of the arsenic concentrations in the remaining 8 samples is 32 mg/kg to 98.5 mg/kg. The 95% UCL (EPC) is 540 mg/kg.

Table A-106
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 9
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-035AN	1.2E-04	8.0
101-07-037	1.2E-04	7.5
101-07-040	1.1E-04	9.7
101-07-052	7.7E-05	5.1
101-07-060	4.7E-05	3.0
101-07-061	5.8E-05	2.9
101-07-062	9.1E-05	4.5
101-07-089K	1.8E-04	6.9
101-07-089Q	7.9E-05	8.7
101-07-089S	1.4E-04	9.3
101-07-089T	1.1E-03	27
101-07-089U	1.1E-04	7.6

Notes:
The EPC Value for arsenic at Property 101-07-089T is based on 9 surface soil samples.
The maximum arsenic concentration is 865 mg/kg. The range of the arsenic concentrations in the remaining 8 samples is 32 mg/kg to 98.5 mg/kg. The 95% UCL (EPC) is 540 mg/kg.

Table A-107
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-008
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.89E+01	2.59E-05	1.50E+00	3.88E-05	3.87E-06	1.50E+00	5.81E-06	4.92E-09	1.51E+01	7.40E-08	4.47E-05
Copper	1.44E+04	6.76E-03	NA		2.70E-04	NA		1.03E-06	NA		
Child Resident											
Arsenic	6.89E+01	6.04E-05	1.50E+00	9.06E-05	6.34E-06	1.50E+00	9.51E-06	2.87E-09	1.51E+01	4.32E-08	1.00E-04
Copper	1.44E+04	1.58E-02	NA		4.42E-04	NA		6.00E-07	NA		
Total Adult Resident				3.9E-05			5.8E-06			7.4E-08	4.5E-05
Total Child Resident				9.1E-05			9.5E-06			4.3E-08	1.0E-04
Total Adult/Child Resident		(89.3% Contribution)		1.3E-04	(10.6% Contribution)		1.5E-05	(0.1% Contribution)		1.2E-07	1.4E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-108
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-008
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.89E+01	7.55E-05	3.00E-04	2.52E-01	1.13E-05	3.00E-04	3.77E-02	1.43E-08	NA		2.89E-01
Copper	1.44E+04	1.97E-02	4.00E-02	4.93E-01	7.87E-04	4.00E-02	1.97E-02	3.00E-06	NA		5.13E-01
Child Resident											
Arsenic	6.89E+01	7.05E-04	3.00E-04	2.35E+00	7.40E-05	3.00E-04	2.47E-01	3.35E-08	NA		2.60E+00
Copper	1.44E+04	1.84E-01	4.00E-02	4.60E+00	5.16E-03	4.00E-02	1.29E-01	7.00E-06	NA		4.73E+00
Total Adult Resident				7.4E-01			5.7E-02			0.0E+00	0.80
Total Child Resident		(94.9% Contribution)		7.0E+00	(5.1% Contribution)		3.8E-01	(0% Contribution)		0.0E+00	7.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-109
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-010
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.89E+01	1.46E-05	1.50E+00	2.19E-05	2.19E-06	1.50E+00	3.28E-06	2.78E-09	1.51E+01	4.18E-08	2.52E-05
Copper	1.12E+04	5.26E-03	NA		2.10E-04	NA		7.99E-07	NA		
Child Resident											
Arsenic	3.89E+01	3.41E-05	1.50E+00	5.12E-05	3.58E-06	1.50E+00	5.37E-06	1.62E-09	1.51E+01	2.44E-08	5.66E-05
Copper	1.12E+04	1.23E-02	NA		3.44E-04	NA		4.66E-07	NA		
Total Adult Resident				2.2E-05			3.3E-06			4.2E-08	2.5E-05
Total Child Resident				5.1E-05			5.4E-06			2.4E-08	5.7E-05
Total Adult/Child Resident		(89.3% Contribution)		7.3E-05	(10.6% Contribution)		8.7E-06	(0.1% Contribution)		6.6E-08	8.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-110
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-010
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.89E+01	4.26E-05	3.00E-04	1.42E-01	6.38E-06	3.00E-04	2.13E-02	8.10E-09	NA		1.6E-01
Copper	1.12E+04	1.53E-02	4.00E-02	3.84E-01	6.12E-04	4.00E-02	1.53E-02	2.33E-06	NA		4.0E-01
Child Resident											
Arsenic	3.89E+01	3.98E-04	3.00E-04	1.33E+00	4.18E-05	3.00E-04	1.39E-01	1.89E-08	NA		1.5E+00
Copper	1.12E+04	1.43E-01	4.00E-02	3.58E+00	4.01E-03	4.00E-02	1.00E-01	5.44E-06	NA		3.7E+00
Total Adult Resident				5.3E-01			3.7E-02			0.0E+00	0.56
Total Child Resident		(95.3% Contribution)		4.9E+00	(4.7% Contribution)		2.4E-01	(0% Contribution)		0.0E+00	5.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-111
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-014
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.78E+01	1.42E-05	1.50E+00	2.13E-05	2.13E-06	1.50E+00	3.19E-06	2.70E-09	1.51E+01	4.06E-08	2.45E-05
Copper	1.02E+04	4.79E-03	NA		1.91E-04	NA		7.28E-07	NA		
Child Resident											
Arsenic	3.78E+01	3.31E-05	1.50E+00	4.97E-05	3.48E-06	1.50E+00	5.22E-06	1.57E-09	1.51E+01	2.37E-08	5.50E-05
Copper	1.02E+04	1.12E-02	NA		3.13E-04	NA		4.25E-07	NA		
Total Adult Resident				2.1E-05			3.2E-06			4.1E-08	2.5E-05
Total Child Resident				5.0E-05			5.2E-06			2.4E-08	5.5E-05
Total Adult/Child Resident		(89.3% Contribution)		7.1E-05	(10.6% Contribution)		8.4E-06	(0.1% Contribution)		6.4E-08	7.9E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-112
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-014
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.78E+01	4.14E-05	3.00E-04	1.38E-01	6.20E-06	3.00E-04	2.07E-02	7.87E-09	NA		1.6E-01
Copper	1.02E+04	1.40E-02	4.00E-02	3.49E-01	5.58E-04	4.00E-02	1.39E-02	2.12E-06	NA		3.6E-01
Child Resident											
Arsenic	3.78E+01	3.87E-04	3.00E-04	1.29E+00	4.06E-05	3.00E-04	1.35E-01	1.84E-08	NA		1.4E+00
Copper	1.02E+04	1.30E-01	4.00E-02	3.26E+00	3.65E-03	4.00E-02	9.13E-02	4.95E-06	NA		3.4E+00
Total Adult Resident				4.9E-01			3.5E-02			0.0E+00	0.52
Total Child Resident		(95.3% Contribution)		4.5E+00	(4.7% Contribution)		2.3E-01	(0% Contribution)		0.0E+00	4.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-113
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-018
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.67E+01	1.38E-05	1.50E+00	2.07E-05	2.06E-06	1.50E+00	3.09E-06	2.62E-09	1.51E+01	3.94E-08	2.38E-05
Copper	7.77E+03	3.65E-03	NA		1.46E-04	NA		5.55E-07	NA		
Child Resident											
Arsenic	3.67E+01	3.22E-05	1.50E+00	4.83E-05	3.38E-06	1.50E+00	5.07E-06	1.53E-09	1.51E+01	2.30E-08	5.34E-05
Copper	7.77E+03	8.52E-03	NA		2.38E-04	NA		3.24E-07	NA		
Total Adult Resident				2.1E-05			3.1E-06			3.9E-08	2.4E-05
Total Child Resident				4.8E-05			5.1E-06			2.3E-08	5.3E-05
Total Adult/Child Resident		(89.3% Contribution)		6.9E-05	(10.6% Contribution)		8.2E-06	(0.1% Contribution)		6.2E-08	7.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-114
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-018
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.67E+01	4.02E-05	3.00E-04	1.34E-01	6.02E-06	3.00E-04	2.01E-02	7.64E-09	NA		1.5E-01
Copper	7.77E+03	1.06E-02	4.00E-02	2.66E-01	4.25E-04	4.00E-02	1.06E-02	1.62E-06	NA		2.8E-01
Child Resident											
Arsenic	3.67E+01	3.75E-04	3.00E-04	1.25E+00	3.94E-05	3.00E-04	1.31E-01	1.78E-08	NA		1.4E+00
Copper	7.77E+03	9.93E-02	4.00E-02	2.48E+00	2.78E-03	4.00E-02	6.95E-02	3.77E-06	NA		2.6E+00
Total Adult Resident				4.0E-01			3.1E-02			0.0E+00	0.43
Total Child Resident		(94.9% Contribution)		3.7E+00	(5.1% Contribution)		2.0E-01	(0% Contribution)		0.0E+00	3.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-115
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-027
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.88E+01	1.08E-05	1.50E+00	1.62E-05	1.62E-06	1.50E+00	2.43E-06	2.06E-09	1.51E+01	3.09E-08	1.87E-05
Copper	6.97E+03	3.27E-03	NA		1.31E-04	NA		4.98E-07	NA		
Child Resident											
Arsenic	2.88E+01	2.52E-05	1.50E+00	3.79E-05	2.65E-06	1.50E+00	3.98E-06	1.20E-09	1.51E+01	1.80E-08	4.19E-05
Copper	6.97E+03	7.64E-03	NA		2.14E-04	NA		2.90E-07	NA		
Total Adult Resident				1.6E-05			2.4E-06			3.1E-08	1.9E-05
Total Child Resident				3.8E-05			4.0E-06			1.8E-08	4.2E-05
Total Adult/Child Resident		(89.3% Contribution)		5.4E-05	(10.6% Contribution)		6.4E-06	(0.1% Contribution)		4.9E-08	6.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-116
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-027
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.88E+01	3.16E-05	3.00E-04	1.05E-01	4.72E-06	3.00E-04	1.57E-02	6.00E-09	NA		1.2E-01
Copper	6.97E+03	9.55E-03	4.00E-02	2.39E-01	3.81E-04	4.00E-02	9.52E-03	1.45E-06	NA		2.5E-01
Child Resident											
Arsenic	2.88E+01	2.95E-04	3.00E-04	9.82E-01	3.09E-05	3.00E-04	1.03E-01	1.40E-08	NA		1.1E+00
Copper	6.97E+03	8.91E-02	4.00E-02	2.23E+00	2.50E-03	4.00E-02	6.24E-02	3.39E-06	NA		2.3E+00
Total Adult Resident				3.4E-01			2.5E-02			0.0E+00	0.37
Total Child Resident		(95.1% Contribution)		3.2E+00	(4.9% Contribution)		1.7E-01	(0% Contribution)		0.0E+00	3.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-117
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-028
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.47E+01	1.68E-05	1.50E+00	2.52E-05	2.51E-06	1.50E+00	3.77E-06	3.19E-09	1.51E+01	4.80E-08	2.90E-05
Copper	1.24E+04	5.82E-03	NA		2.32E-04	NA		8.85E-07	NA		
Child Resident											
Arsenic	4.47E+01	3.92E-05	1.50E+00	5.88E-05	4.11E-06	1.50E+00	6.17E-06	1.86E-09	1.51E+01	2.80E-08	6.50E-05
Copper	1.24E+04	1.36E-02	NA		3.80E-04	NA		5.16E-07	NA		
Total Adult Resident				2.5E-05			3.8E-06			4.8E-08	2.9E-05
Total Child Resident				5.9E-05			6.2E-06			2.8E-08	6.5E-05
Total Adult/Child Resident		(89.3% Contribution)		8.4E-05	(10.6% Contribution)		9.9E-06	(0.1% Contribution)		7.6E-08	9.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-118
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-028
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.47E+01	4.90E-05	3.00E-04	1.63E-01	7.33E-06	3.00E-04	2.44E-02	9.31E-09	NA		1.9E-01
Copper	1.24E+04	1.70E-02	4.00E-02	4.25E-01	6.78E-04	4.00E-02	1.69E-02	2.58E-06	NA		4.4E-01
Child Resident											
Arsenic	4.47E+01	4.57E-04	3.00E-04	1.52E+00	4.80E-05	3.00E-04	1.60E-01	2.17E-08	NA		1.7E+00
Copper	1.24E+04	1.59E-01	4.00E-02	3.96E+00	4.44E-03	4.00E-02	1.11E-01	6.02E-06	NA		4.1E+00
Total Adult Resident				5.9E-01			4.1E-02			0.0E+00	0.63
Total Child Resident		(95.3% Contribution)		5.5E+00	(4.7% Contribution)		2.7E-01	(0% Contribution)		0.0E+00	5.8
Percent Contribution by Route (Adult)				93.4%			6.6%			0.0%	
Percent Contribution by Route (Child)				95.3%			4.7%			0.00%	

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-119
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-029
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.19E+01	1.95E-05	1.50E+00	2.93E-05	2.92E-06	1.50E+00	4.38E-06	3.70E-09	1.51E+01	5.58E-08	3.37E-05
Copper	1.21E+04	5.68E-03	NA		2.27E-04	NA		8.64E-07	NA		
Child Resident											
Arsenic	5.19E+01	4.55E-05	1.50E+00	6.83E-05	4.78E-06	1.50E+00	7.17E-06	2.16E-09	1.51E+01	3.25E-08	7.55E-05
Copper	1.21E+04	1.33E-02	NA		3.71E-04	NA		5.04E-07	NA		
Total Adult Resident				2.9E-05			4.4E-06			5.6E-08	3.4E-05
Total Child Resident				6.8E-05			7.2E-06			3.3E-08	7.5E-05
Total Adult/Child Resident		(89.3% Contribution)		9.8E-05	(10.6% Contribution)		1.2E-05	(0.1% Contribution)		8.8E-08	1.1E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-120
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-029
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.19E+01	5.69E-05	3.00E-04	1.90E-01	8.51E-06	3.00E-04	2.84E-02	1.08E-08	NA		2.2E-01
Copper	1.21E+04	1.66E-02	4.00E-02	4.14E-01	6.61E-04	4.00E-02	1.65E-02	2.52E-06	NA		4.3E-01
Child Resident											
Arsenic	5.19E+01	5.31E-04	3.00E-04	1.77E+00	5.57E-05	3.00E-04	1.86E-01	2.52E-08	NA		2.0E+00
Copper	1.21E+04	1.55E-01	4.00E-02	3.87E+00	4.33E-03	4.00E-02	1.08E-01	5.88E-06	NA		4.0E+00
Total Adult Resident				6.0E-01			4.5E-02			0.0E+00	0.65
Total Child Resident			(95% Contribution)	5.6E+00		(5% Contribution)	2.9E-01		(0% Contribution)	0.0E+00	5.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-121
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-030
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.21E+01	1.21E-05	1.50E+00	1.81E-05	1.80E-06	1.50E+00	2.71E-06	2.29E-09	1.51E+01	3.45E-08	2.08E-05
Copper	1.29E+04	6.06E-03	NA		2.42E-04	NA		9.21E-07	NA		
Child Resident											
Arsenic	3.21E+01	2.81E-05	1.50E+00	4.22E-05	2.95E-06	1.50E+00	4.43E-06	1.34E-09	1.51E+01	2.01E-08	4.67E-05
Copper	1.29E+04	1.41E-02	NA		3.96E-04	NA		5.37E-07	NA		
Total Adult Resident				1.8E-05			2.7E-06			3.4E-08	2.1E-05
Total Child Resident				4.2E-05			4.4E-06			2.0E-08	4.7E-05
Total Adult/Child Resident		(89.3% Contribution)		6.0E-05	(10.6% Contribution)		7.1E-06	(0.1% Contribution)		5.5E-08	6.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-122
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-030
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.21E+01	3.52E-05	3.00E-04	1.17E-01	5.26E-06	3.00E-04	1.75E-02	6.68E-09	NA		1.3E-01
Copper	1.29E+04	1.77E-02	4.00E-02	4.42E-01	7.05E-04	4.00E-02	1.76E-02	2.69E-06	NA		4.6E-01
Child Resident											
Arsenic	3.21E+01	3.28E-04	3.00E-04	1.09E+00	3.45E-05	3.00E-04	1.15E-01	1.56E-08	NA		1.2E+00
Copper	1.29E+04	1.65E-01	4.00E-02	4.12E+00	4.62E-03	4.00E-02	1.15E-01	6.27E-06	NA		4.2E+00
Total Adult Resident				5.6E-01			3.5E-02			0.0E+00	0.59
Total Child Resident		(95.8% Contribution)		5.2E+00	(4.2% Contribution)		2.3E-01	(0% Contribution)		0.0E+00	5.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-123
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-034
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	8.45E+01	3.17E-05	1.50E+00	4.76E-05	4.75E-06	1.50E+00	7.13E-06	6.03E-09	1.51E+01	9.08E-08	5.48E-05
Copper	1.62E+04	7.61E-03	NA		3.04E-04	NA		1.16E-06	NA		
Child Resident											
Arsenic	8.45E+01	7.41E-05	1.50E+00	1.11E-04	7.78E-06	1.50E+00	1.17E-05	3.52E-09	1.51E+01	5.30E-08	1.23E-04
Copper	1.62E+04	1.78E-02	NA		4.97E-04	NA		6.75E-07	NA		
Total Adult Resident				4.8E-05			7.1E-06			9.1E-08	5.5E-05
Total Child Resident				1.1E-04			1.2E-05			5.3E-08	1.2E-04
Total Adult/Child Resident		(89.3% Contribution)		1.6E-04	(10.6% Contribution)		1.9E-05	(0.1% Contribution)		1.4E-07	1.8E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-124
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-034
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	8.45E+01	9.26E-05	3.00E-04	3.09E-01	1.39E-05	3.00E-04	4.62E-02	1.76E-08	NA		3.5E-01
Copper	1.62E+04	2.22E-02	4.00E-02	5.55E-01	8.85E-04	4.00E-02	2.21E-02	3.37E-06	NA		5.8E-01
Child Resident											
Arsenic	8.45E+01	8.64E-04	3.00E-04	2.88E+00	9.08E-05	3.00E-04	3.03E-01	4.10E-08	NA		3.2E+00
Copper	1.62E+04	2.07E-01	4.00E-02	5.18E+00	5.80E-03	4.00E-02	1.45E-01	7.87E-06	NA		5.3E+00
Total Adult Resident				8.6E-01			6.8E-02			0.0E+00	0.93
Total Child Resident		(94.7% Contribution)		8.1E+00	(5.3% Contribution)		4.5E-01	(0% Contribution)		0.0E+00	8.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-125
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AE
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.96E+01	1.86E-05	1.50E+00	2.80E-05	2.79E-06	1.50E+00	4.18E-06	3.54E-09	1.51E+01	5.33E-08	3.22E-05
Copper	1.21E+04	5.68E-03	NA		2.27E-04	NA		8.64E-07	NA		
Child Resident											
Arsenic	4.96E+01	4.35E-05	1.50E+00	6.52E-05	4.57E-06	1.50E+00	6.85E-06	2.07E-09	1.51E+01	3.11E-08	7.21E-05
Copper	1.21E+04	1.33E-02	NA		3.71E-04	NA		5.04E-07	NA		
Total Adult Resident				2.8E-05			4.2E-06			5.3E-08	3.2E-05
Total Child Resident				6.5E-05			6.8E-06			3.1E-08	7.2E-05
Total Adult/Child Resident		(89.3% Contribution)		9.3E-05	(10.6% Contribution)		1.1E-05	(0.1% Contribution)		8.4E-08	1.0E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-126
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AE
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.96E+01	5.44E-05	3.00E-04	1.81E-01	8.13E-06	3.00E-04	2.71E-02	1.03E-08	NA		2.1E-01
Copper	1.21E+04	1.66E-02	4.00E-02	4.14E-01	6.61E-04	4.00E-02	1.65E-02	2.52E-06	NA		4.3E-01
Child Resident											
Arsenic	4.96E+01	5.07E-04	3.00E-04	1.69E+00	5.33E-05	3.00E-04	1.78E-01	2.41E-08	NA		1.9E+00
Copper	1.21E+04	1.55E-01	4.00E-02	3.87E+00	4.33E-03	4.00E-02	1.08E-01	5.88E-06	NA		4.0E+00
Total Adult Resident				6.0E-01			4.4E-02			0.0E+00	0.64
Total Child Resident		(95.1% Contribution)		5.6E+00	(4.9% Contribution)		2.9E-01	(0% Contribution)		0.0E+00	5.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-127
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AS
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.79E+01	1.05E-05	1.50E+00	1.57E-05	1.57E-06	1.50E+00	2.35E-06	1.99E-09	1.51E+01	3.00E-08	1.81E-05
Copper	2.51E+04	1.18E-02	NA		4.70E-04	NA		1.79E-06	NA		
Child Resident											
Arsenic	2.79E+01	2.45E-05	1.50E+00	3.67E-05	2.57E-06	1.50E+00	3.85E-06	1.16E-09	1.51E+01	1.75E-08	4.06E-05
Copper	2.51E+04	2.75E-02	NA		7.70E-04	NA		1.05E-06	NA		
Total Adult Resident				1.6E-05			2.4E-06			3.0E-08	1.8E-05
Total Child Resident				3.7E-05			3.9E-06			1.7E-08	4.1E-05
Total Adult/Child Resident		(89.3% Contribution)		5.2E-05	(10.6% Contribution)		6.2E-06	(0.1% Contribution)		4.7E-08	5.9E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-128
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-035AS
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.79E+01	3.06E-05	3.00E-04	1.02E-01	4.57E-06	3.00E-04	1.52E-02	5.81E-09	NA		1.2E-01
Copper	2.51E+04	3.44E-02	4.00E-02	8.60E-01	1.37E-03	4.00E-02	3.43E-02	5.23E-06	NA		8.9E-01
Child Resident											
Arsenic	2.79E+01	2.85E-04	3.00E-04	9.51E-01	3.00E-05	3.00E-04	9.99E-02	1.36E-08	NA		1.1E+00
Copper	2.51E+04	3.21E-01	4.00E-02	8.02E+00	8.99E-03	4.00E-02	2.25E-01	1.22E-05	NA		8.2E+00
Total Adult Resident				9.6E-01			5.0E-02			0.0E+00	1.01
Total Child Resident		(96.5% Contribution)		9.0E+00	(3.5% Contribution)		3.2E-01	(0% Contribution)		0.0E+00	9.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-129
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-041
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.76E+01	6.61E-06	1.50E+00	9.92E-06	9.89E-07	1.50E+00	1.48E-06	1.26E-09	1.51E+01	1.89E-08	1.14E-05
Copper	4.07E+03	1.91E-03	NA		7.63E-05	NA		2.91E-07	NA		
Child Resident											
Arsenic	1.76E+01	1.54E-05	1.50E+00	2.31E-05	1.62E-06	1.50E+00	2.43E-06	7.33E-10	1.51E+01	1.10E-08	2.56E-05
Copper	4.07E+03	4.46E-03	NA		1.25E-04	NA		1.69E-07	NA		
Total Adult Resident				9.9E-06			1.5E-06			1.9E-08	1.1E-05
Total Child Resident				2.3E-05			2.4E-06			1.1E-08	2.6E-05
Total Adult/Child Resident		(89.3% Contribution)		3.3E-05	(10.6% Contribution)		3.9E-06	(0.1% Contribution)		3.0E-08	3.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-130
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-041
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.76E+01	1.93E-05	3.00E-04	6.43E-02	2.89E-06	3.00E-04	9.62E-03	3.66E-09	NA		7.4E-02
Copper	4.07E+03	5.58E-03	4.00E-02	1.39E-01	2.22E-04	4.00E-02	5.56E-03	8.47E-07	NA		1.4E-01
Child Resident											
Arsenic	1.76E+01	1.80E-04	3.00E-04	6.00E-01	1.89E-05	3.00E-04	6.30E-02	8.55E-09	NA		6.6E-01
Copper	4.07E+03	5.20E-02	4.00E-02	1.30E+00	1.46E-03	4.00E-02	3.64E-02	1.98E-06	NA		1.3E+00
Total Adult Resident				2.0E-01			1.5E-02			0.0E+00	0.22
Total Child Resident			(95% Contribution)	1.9E+00		(5% Contribution)	9.9E-02		(0% Contribution)	0.0E+00	2.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-131
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-042
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.01E+01	7.55E-06	1.50E+00	1.13E-05	1.13E-06	1.50E+00	1.70E-06	1.43E-09	1.51E+01	2.16E-08	1.30E-05
Copper	4.85E+03	2.28E-03	NA		9.09E-05	NA		3.46E-07	NA		
Child Resident											
Arsenic	2.01E+01	1.76E-05	1.50E+00	2.64E-05	1.85E-06	1.50E+00	2.78E-06	8.37E-10	1.51E+01	1.26E-08	2.92E-05
Copper	4.85E+03	5.32E-03	NA		1.49E-04	NA		2.02E-07	NA		
Total Adult Resident				1.1E-05			1.7E-06			2.2E-08	1.3E-05
Total Child Resident				2.6E-05			2.8E-06			1.3E-08	2.9E-05
Total Adult/Child Resident		(89.3% Contribution)		3.8E-05	(10.6% Contribution)		4.5E-06	(0.1% Contribution)		3.4E-08	4.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-132
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-042
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.01E+01	2.20E-05	3.00E-04	7.34E-02	3.30E-06	3.00E-04	1.10E-02	4.18E-09	NA		8.4E-02
Copper	4.85E+03	6.64E-03	4.00E-02	1.66E-01	2.65E-04	4.00E-02	6.63E-03	1.01E-06	NA		1.7E-01
Child Resident											
Arsenic	2.01E+01	2.06E-04	3.00E-04	6.85E-01	2.16E-05	3.00E-04	7.20E-02	9.76E-09	NA		7.6E-01
Copper	4.85E+03	6.20E-02	4.00E-02	1.55E+00	1.74E-03	4.00E-02	4.34E-02	2.36E-06	NA		1.6E+00
Total Adult Resident				2.4E-01			1.8E-02			0.0E+00	0.26
Total Child Resident		(95.1% Contribution)		2.2E+00	(4.9% Contribution)		1.2E-01	(0% Contribution)		0.0E+00	2.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-133
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-046
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.03E+01	7.63E-06	1.50E+00	1.14E-05	1.14E-06	1.50E+00	1.71E-06	1.45E-09	1.51E+01	2.18E-08	1.32E-05
Copper	4.33E+03	2.03E-03	NA		8.11E-05	NA		3.09E-07	NA		
Child Resident											
Arsenic	2.03E+01	1.78E-05	1.50E+00	2.67E-05	1.87E-06	1.50E+00	2.80E-06	8.45E-10	1.51E+01	1.27E-08	2.95E-05
Copper	4.33E+03	4.75E-03	NA		1.33E-04	NA		1.80E-07	NA		
Total Adult Resident				1.1E-05			1.7E-06			2.2E-08	1.3E-05
Total Child Resident				2.7E-05			2.8E-06			1.3E-08	3.0E-05
Total Adult/Child Resident		(89.3% Contribution)		3.8E-05	(10.6% Contribution)		4.5E-06	(0.1% Contribution)		3.5E-08	4.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-134
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-046
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.03E+01	2.22E-05	3.00E-04	7.42E-02	3.33E-06	3.00E-04	1.11E-02	4.23E-09	NA		8.5E-02
Copper	4.33E+03	5.93E-03	4.00E-02	1.48E-01	2.37E-04	4.00E-02	5.92E-03	9.01E-07	NA		1.5E-01
Child Resident											
Arsenic	2.03E+01	2.08E-04	3.00E-04	6.92E-01	2.18E-05	3.00E-04	7.27E-02	9.86E-09	NA		7.6E-01
Copper	4.33E+03	5.54E-02	4.00E-02	1.38E+00	1.55E-03	4.00E-02	3.88E-02	2.10E-06	NA		1.4E+00
Total Adult Resident				2.2E-01			1.7E-02			0.0E+00	0.24
Total Child Resident		(94.9% Contribution)		2.1E+00	(5.1% Contribution)		1.1E-01	(0% Contribution)		0.0E+00	2.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-135
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-047
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.23E+01	1.59E-05	1.50E+00	2.38E-05	2.38E-06	1.50E+00	3.57E-06	3.02E-09	1.51E+01	4.54E-08	2.75E-05
Copper	1.05E+04	4.93E-03	NA		1.97E-04	NA		7.49E-07	NA		
Child Resident											
Arsenic	4.23E+01	3.71E-05	1.50E+00	5.56E-05	3.89E-06	1.50E+00	5.84E-06	1.76E-09	1.51E+01	2.65E-08	6.15E-05
Copper	1.05E+04	1.15E-02	NA		3.22E-04	NA		4.37E-07	NA		
Total Adult Resident				2.4E-05			3.6E-06			4.5E-08	2.7E-05
Total Child Resident				5.6E-05			5.8E-06			2.7E-08	6.1E-05
Total Adult/Child Resident		(89.3% Contribution)		7.9E-05	(10.6% Contribution)		9.4E-06	(0.1% Contribution)		7.2E-08	8.9E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-136
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-047
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.23E+01	4.64E-05	3.00E-04	1.55E-01	6.94E-06	3.00E-04	2.31E-02	8.81E-09	NA		1.8E-01
Copper	1.05E+04	1.44E-02	4.00E-02	3.60E-01	5.74E-04	4.00E-02	1.43E-02	2.19E-06	NA		3.7E-01
Child Resident											
Arsenic	4.23E+01	4.33E-04	3.00E-04	1.44E+00	4.54E-05	3.00E-04	1.51E-01	2.05E-08	NA		**1.6E+00**
Copper	1.05E+04	1.34E-01	4.00E-02	3.36E+00	3.76E-03	4.00E-02	9.40E-02	5.10E-06	NA		**3.5E+00**
Total Adult Resident				5.1E-01			3.7E-02			0.0E+00	0.55
Total Child Resident		(95.1% Contribution)		4.8E+00	(4.9% Contribution)		2.5E-01	(0% Contribution)		0.0E+00	**5.0**

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.
Bolded values denote hazards greater than 1

Table A-137
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-050A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.63E+01	6.12E-06	1.50E+00	9.19E-06	9.16E-07	1.50E+00	1.37E-06	1.16E-09	1.51E+01	1.75E-08	1.06E-05
Copper	4.26E+03	2.00E-03	NA		7.98E-05	NA		3.04E-07	NA		
Child Resident											
Arsenic	1.63E+01	1.43E-05	1.50E+00	2.14E-05	1.50E-06	1.50E+00	2.25E-06	6.79E-10	1.51E+01	1.02E-08	2.37E-05
Copper	4.26E+03	4.67E-03	NA		1.31E-04	NA		1.77E-07	NA		
Total Adult Resident				9.2E-06			1.4E-06			1.8E-08	1.1E-05
Total Child Resident				2.1E-05			2.3E-06			1.0E-08	2.4E-05
Total Adult/Child Resident		(89.3% Contribution)		3.1E-05	(10.6% Contribution)		3.6E-06	(0.1% Contribution)		2.8E-08	3.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-138
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 10 - Property 101-07-050A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 10, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.63E+01	1.79E-05	3.00E-04	5.95E-02	2.67E-06	3.00E-04	8.91E-03	3.39E-09	NA		6.8E-02
Copper	4.26E+03	5.84E-03	4.00E-02	1.46E-01	2.33E-04	4.00E-02	5.82E-03	8.87E-07	NA		1.5E-01
Child Resident											
Arsenic	1.63E+01	1.67E-04	3.00E-04	5.56E-01	1.75E-05	3.00E-04	5.84E-02	7.92E-09	NA		6.1E-01
Copper	4.26E+03	5.45E-02	4.00E-02	1.36E+00	1.53E-03	4.00E-02	3.81E-02	2.07E-06	NA		1.4E+00
Total Adult Resident				2.1E-01			1.5E-02			0.0E+00	0.22
Total Child Resident			(95.2% Contribution)	1.9E+00		(4.8% Contribution)	9.6E-02		(0% Contribution)	0.0E+00	2.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-139
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-008	**Adult Resident**	Arsenic	6.89E+01	3.88E-05	5.81E-06	7.40E-08	4.47E-05	2.52E-01	3.77E-02		2.89E-01
		Copper	1.44E+04					4.93E-01	1.97E-02		5.13E-01
		Total					4.5E-05				0.8
	Child Resident	Arsenic	6.89E+01	9.06E-05	9.51E-06	4.32E-08	1.00E-04	2.35E+00	2.47E-01		2.60E+00
		Copper	1.44E+04					4.60E+00	1.29E-01		4.73E+00
		Total					1.0E-04				7.3
	Adult/Child Resident	Arsenic	6.89E+01	1.29E-04	1.53E-05	1.17E-07	1.45E-04				
		Copper	1.44E+04								
		Total					1.4E-04				NA
101-07-010	**Adult Resident**	Arsenic	3.89E+01	2.19E-05	3.28E-06	4.18E-08	2.52E-05	1.42E-01	2.13E-02		1.63E-01
		Copper	1.12E+04					3.84E-01	1.53E-02		3.99E-01
		Total					2.5E-05				0.6
	Child Resident	Arsenic	3.89E+01	5.12E-05	5.37E-06	2.44E-08	5.66E-05	1.33E+00	1.39E-01		1.47E+00
		Copper	1.12E+04					3.58E+00	1.00E-01		3.68E+00
		Total					5.7E-05				5.1
	Adult/Child Resident	Arsenic	3.89E+01	7.31E-05	8.65E-06	6.62E-08	8.18E-05				
		Copper	1.12E+04								
		Total					8.2E-05				NA
101-07-014	**Adult Resident**	Arsenic	3.78E+01	2.13E-05	3.19E-06	4.06E-08	2.45E-05	1.38E-01	2.07E-02		1.59E-01
		Copper	1.02E+04					3.49E-01	1.39E-02		3.63E-01
		Total					2.5E-05				0.5
	Child Resident	Arsenic	3.78E+01	4.97E-05	5.22E-06	2.37E-08	5.50E-05	1.29E+00	1.35E-01		1.42E+00
		Copper	1.02E+04					3.26E+00	9.13E-02		3.35E+00
		Total					5.5E-05				4.8
	Adult/Child Resident	Arsenic	3.78E+01	7.10E-05	8.41E-06	6.43E-08	7.95E-05				
		Copper	1.02E+04								
		Total					7.9E-05				NA

Table A-139
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-018	**Adult Resident**	Arsenic	3.67E+01	2.07E-05	3.09E-06	3.94E-08	2.38E-05	1.34E-01	2.01E-02		1.54E-01
		Copper	7.77E+03					2.66E-01	1.06E-02		2.77E-01
		Total					2.4E-05				0.4
	Child Resident	Arsenic	3.67E+01	4.83E-05	5.07E-06	2.30E-08	5.34E-05	1.25E+00	1.31E-01		1.38E+00
		Copper	7.77E+03					2.48E+00	6.95E-02		2.55E+00
		Total					5.3E-05				3.9
	Adult/Child Resident	Arsenic	3.67E+01	6.89E-05	8.16E-06	6.24E-08	7.72E-05				
		Copper	7.77E+03								
		Total					7.7E-05				NA
101-07-027	**Adult Resident**	Arsenic	2.88E+01	1.62E-05	2.43E-06	3.09E-08	1.87E-05	1.05E-01	1.57E-02		1.21E-01
		Copper	6.97E+03					2.39E-01	9.52E-03		2.48E-01
		Total					1.9E-05				0.4
	Child Resident	Arsenic	2.88E+01	3.79E-05	3.98E-06	1.80E-08	4.19E-05	9.82E-01	1.03E-01		1.09E+00
		Copper	6.97E+03					2.23E+00	6.24E-02		2.29E+00
		Total					4.2E-05				3.4
	Adult/Child Resident	Arsenic	2.88E+01	5.41E-05	6.41E-06	4.90E-08	6.06E-05				
		Copper	6.97E+03								
		Total					6.1E-05				NA
101-07-028	**Adult Resident**	Arsenic	4.47E+01	2.52E-05	3.77E-06	4.80E-08	2.90E-05	1.63E-01	2.44E-02		1.88E-01
		Copper	1.24E+04					4.25E-01	1.69E-02		4.42E-01
		Total					2.9E-05				0.6
	Child Resident	Arsenic	4.47E+01	5.88E-05	6.17E-06	2.80E-08	6.50E-05	1.52E+00	1.60E-01		1.68E+00
		Copper	1.24E+04					3.96E+00	1.11E-01		4.07E+00
		Total					6.5E-05				5.8
	Adult/Child Resident	Arsenic	4.47E+01	8.40E-05	9.94E-06	7.60E-08	9.40E-05				
		Copper	1.24E+04								
		Total					9.4E-05				NA

Table A-139
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-029	**Adult Resident**	Arsenic	5.19E+01	2.93E-05	4.38E-06	5.58E-08	3.37E-05	1.90E-01	2.84E-02		2.18E-01
		Copper	1.21E+04					4.14E-01	1.65E-02		4.31E-01
		Total					3.4E-05				0.6
	Child Resident	Arsenic	5.19E+01	6.83E-05	7.17E-06	3.25E-08	7.55E-05	1.77E+00	1.86E-01		1.96E+00
		Copper	1.21E+04					3.87E+00	1.08E-01		3.98E+00
		Total					7.5E-05				5.9
	Adult/Child Resident	Arsenic	5.19E+01	9.75E-05	1.15E-05	8.83E-08	1.09E-04				
		Copper	1.21E+04								
		Total					1.1E-04				NA
101-07-030	**Adult Resident**	Arsenic	3.21E+01	1.81E-05	2.71E-06	3.45E-08	2.08E-05	1.17E-01	1.75E-02		1.35E-01
		Copper	1.29E+04					4.42E-01	1.76E-02		4.59E-01
		Total					2.1E-05				0.6
	Child Resident	Arsenic	3.21E+01	4.22E-05	4.43E-06	2.01E-08	4.67E-05	1.09E+00	1.15E-01		1.21E+00
		Copper	1.29E+04					4.12E+00	1.15E-01		4.24E+00
		Total					4.7E-05				5.4
	Adult/Child Resident	Arsenic	3.21E+01	6.03E-05	7.14E-06	5.46E-08	6.75E-05				
		Copper	1.29E+04								
		Total					6.7E-05				NA
101-07-034	**Adult Resident**	Arsenic	8.45E+01	4.76E-05	7.13E-06	9.08E-08	5.48E-05	3.09E-01	4.62E-02		3.55E-01
		Copper	1.62E+04					5.55E-01	2.21E-02		5.77E-01
		Total					5.5E-05				0.9
	Child Resident	Arsenic	8.45E+01	1.11E-04	1.17E-05	5.30E-08	1.23E-04	2.88E+00	3.03E-01		3.18E+00
		Copper	1.62E+04					5.18E+00	1.45E-01		5.32E+00
		Total					1.2E-04				8.5
	Adult/Child Resident	Arsenic	8.45E+01	1.59E-04	1.88E-05	1.44E-07	1.78E-04				
		Copper	1.62E+04								
		Total					1.8E-04				NA

Table A-139
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-035AE	**Adult Resident**	Arsenic	4.96E+01	2.80E-05	4.18E-06	5.33E-08	3.22E-05	1.81E-01	2.71E-02		2.08E-01
		Copper	1.21E+04					4.14E-01	1.65E-02		4.31E-01
		Total					3.2E-05				0.6
	Child Resident	Arsenic	4.96E+01	6.52E-05	6.85E-06	3.11E-08	7.21E-05	1.69E+00	1.78E-01		1.87E+00
		Copper	1.21E+04					3.87E+00	1.08E-01		3.98E+00
		Total					7.2E-05				5.8
	Adult/Child Resident	Arsenic	4.96E+01	9.32E-05	1.10E-05	8.44E-08	1.04E-04				
		Copper	1.21E+04								
		Total					1.0E-04				NA
101-07-035AS	**Adult Resident**	Arsenic	2.79E+01	1.57E-05	2.35E-06	3.00E-08	1.81E-05	1.02E-01	1.52E-02		1.17E-01
		Copper	2.51E+04					8.60E-01	3.43E-02		8.94E-01
		Total					1.8E-05				1.0
	Child Resident	Arsenic	2.79E+01	3.67E-05	3.85E-06	1.75E-08	4.06E-05	9.51E-01	9.99E-02		1.05E+00
		Copper	2.51E+04					8.02E+00	2.25E-01		8.25E+00
		Total					4.1E-05				9.3
	Adult/Child Resident	Arsenic	2.79E+01	5.24E-05	6.21E-06	4.75E-08	5.87E-05				
		Copper	2.51E+04								
		Total					5.9E-05				NA
101-07-041	**Adult Resident**	Arsenic	1.76E+01	9.92E-06	1.48E-06	1.89E-08	1.14E-05	6.43E-02	9.62E-03		7.39E-02
		Copper	4.07E+03					1.39E-01	5.56E-03		1.45E-01
		Total					1.1E-05				0.2
	Child Resident	Arsenic	1.76E+01	2.31E-05	2.43E-06	1.10E-08	2.56E-05	6.00E-01	6.30E-02		6.63E-01
		Copper	4.07E+03					1.30E+00	3.64E-02		1.34E+00
		Total					2.6E-05				2.0
	Adult/Child Resident	Arsenic	1.76E+01	3.31E-05	3.91E-06	2.99E-08	3.70E-05				
		Copper	4.07E+03								
		Total					3.7E-05				NA

Table A-139
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-042	**Adult Resident**	Arsenic	2.01E+01	1.13E-05	1.70E-06	2.16E-08	1.30E-05	7.34E-02	1.10E-02		8.44E-02
		Copper	4.85E+03					1.66E-01	6.63E-03		1.73E-01
		Total					1.3E-05				0.3
	Child Resident	Arsenic	2.01E+01	2.64E-05	2.78E-06	1.26E-08	2.92E-05	6.85E-01	7.20E-02		7.57E-01
		Copper	4.85E+03					1.55E+00	4.34E-02		1.59E+00
		Total					2.9E-05				2.4
	Adult/Child Resident	Arsenic	2.01E+01	3.78E-05	4.47E-06	3.42E-08	4.23E-05				
		Copper	4.85E+03								
		Total					4.2E-05				NA
101-07-046	**Adult Resident**	Arsenic	2.03E+01	1.14E-05	1.71E-06	2.18E-08	1.32E-05	7.42E-02	1.11E-02		8.53E-02
		Copper	4.33E+03					1.48E-01	5.92E-03		1.54E-01
		Total					1.3E-05				0.2
	Child Resident	Arsenic	2.03E+01	2.67E-05	2.80E-06	1.27E-08	2.95E-05	6.92E-01	7.27E-02		7.65E-01
		Copper	4.33E+03					1.38E+00	3.88E-02		1.42E+00
		Total					3.0E-05				2.2
	Adult/Child Resident	Arsenic	2.03E+01	3.81E-05	4.51E-06	3.45E-08	4.27E-05				
		Copper	4.33E+03								
		Total					4.3E-05				NA
101-07-047	**Adult Resident**	Arsenic	4.23E+01	2.38E-05	3.57E-06	4.54E-08	2.75E-05	1.55E-01	2.31E-02		1.78E-01
		Copper	1.05E+04					3.60E-01	1.43E-02		3.74E-01
		Total					2.7E-05				0.6
	Child Resident	Arsenic	4.23E+01	5.56E-05	5.84E-06	2.65E-08	6.15E-05	1.44E+00	1.51E-01		1.59E+00
		Copper	1.05E+04					3.36E+00	9.40E-02		3.45E+00
		Total					6.1E-05				5.0
	Adult/Child Resident	Arsenic	4.23E+01	7.95E-05	9.41E-06	7.19E-08	8.89E-05				
		Copper	1.05E+04								
		Total					8.9E-05				NA

Table A-139
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-050A	**Adult Resident**	Arsenic	1.63E+01	9.19E-06	1.37E-06	1.75E-08	1.06E-05	5.95E-02	8.91E-03		6.85E-02
		Copper	4.26E+03					1.46E-01	5.82E-03		1.52E-01
		Total					1.1E-05				0.2
	Child Resident	Arsenic	1.63E+01	2.14E-05	2.25E-06	1.02E-08	2.37E-05	5.56E-01	5.84E-02		6.14E-01
		Copper	4.26E+03					1.36E+00	3.81E-02		1.40E+00
		Total					2.4E-05				2.0
	Adult/Child Resident	Arsenic	1.63E+01	3.06E-05	3.63E-06	2.77E-08	3.43E-05				
		Copper	4.26E+03								
		Total					3.4E-05				NA

Notes:
NA = Not applicable

Table A-140
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 10
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-008	1.4E-04	7.3
101-07-010	8.2E-05	5.1
101-07-014	7.9E-05	4.8
101-07-018	7.7E-05	3.9
101-07-027	6.1E-05	3.4
101-07-028	9.4E-05	5.8
101-07-029	1.1E-04	5.9
101-07-030	6.7E-05	5.4
101-07-034	1.8E-04	8.5
101-07-035AE	1.0E-04	5.8
101-07-035AS	5.9E-05	9.3
101-07-041	3.7E-05	2.0
101-07-042	4.2E-05	2.4
101-07-046	4.3E-05	2.2
101-07-047	8.9E-05	5.0
101-07-050A	3.4E-05	2.0

Table A-141
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-065
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.53E+01	5.75E-06	1.50E+00	8.63E-06	8.61E-07	1.50E+00	1.29E-06	1.09E-09	1.51E+01	1.64E-08	9.94E-06
Copper	2.56E+03	1.20E-03	NA		4.79E-05	NA		1.83E-07	NA		
Child Resident											
Arsenic	1.53E+01	1.34E-05	1.50E+00	2.01E-05	1.41E-06	1.50E+00	2.11E-06	6.37E-10	1.51E+01	9.59E-09	2.23E-05
Copper	2.56E+03	2.80E-03	NA		7.85E-05	NA		1.06E-07	NA		
Total Adult Resident				8.6E-06			1.3E-06			1.6E-08	9.9E-06
Total Child Resident				2.0E-05			2.1E-06			9.6E-09	2.2E-05
Total Adult/Child Resident		(89.3% Contribution)		2.9E-05	(10.6% Contribution)		3.4E-06	(0.1% Contribution)		2.6E-08	3.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-142
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-065
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	1.53E+01	1.68E-05	3.00E-04	5.59E-02	2.51E-06	3.00E-04	8.37E-03	3.19E-09	NA		6.43E-02
Copper	2.56E+03	3.50E-03	4.00E-02	8.76E-02	1.40E-04	4.00E-02	3.49E-03	5.32E-07	NA		9.11E-02
Child Resident											
Arsenic	1.53E+01	1.57E-04	3.00E-04	5.22E-01	1.64E-05	3.00E-04	5.48E-02	7.44E-09	NA		5.77E-01
Copper	2.56E+03	3.27E-02	4.00E-02	8.17E-01	9.15E-04	4.00E-02	2.29E-02	1.24E-06	NA		8.40E-01
Total Adult Resident				1.4E-01			1.2E-02			0.0E+00	0.16
Total Child Resident		(94.5% Contribution)		1.3E+00	(5.5% Contribution)		7.8E-02	(0% Contribution)		0.0E+00	1.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-143
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-066
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.22E+01	4.58E-06	1.50E+00	6.88E-06	6.86E-07	1.50E+00	1.03E-06	8.71E-10	1.51E+01	1.31E-08	7.92E-06
Copper	3.31E+03	1.55E-03	NA		6.20E-05	NA		2.36E-07	NA		
Child Resident											
Arsenic	1.22E+01	1.07E-05	1.50E+00	1.60E-05	1.12E-06	1.50E+00	1.68E-06	5.08E-10	1.51E+01	7.65E-09	1.77E-05
Copper	3.31E+03	3.63E-03	NA		1.02E-04	NA		1.38E-07	NA		
Total Adult Resident				6.9E-06			1.0E-06			1.3E-08	7.9E-06
Total Child Resident				1.6E-05			1.7E-06			7.6E-09	1.8E-05
Total Adult/Child Resident		(89.3% Contribution)		2.3E-05	(10.6% Contribution)		2.7E-06	(0.1% Contribution)		2.1E-08	2.6E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-144
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-066
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	1.22E+01	1.34E-05	3.00E-04	4.46E-02	2.00E-06	3.00E-04	6.67E-03	2.54E-09	NA		5.12E-02
Copper	3.31E+03	4.53E-03	4.00E-02	1.13E-01	1.81E-04	4.00E-02	4.52E-03	6.89E-07	NA		1.18E-01
Child Resident											
Arsenic	1.22E+01	1.25E-04	3.00E-04	4.16E-01	1.31E-05	3.00E-04	4.37E-02	5.93E-09	NA		4.60E-01
Copper	3.31E+03	4.23E-02	4.00E-02	1.06E+00	1.18E-03	4.00E-02	2.96E-02	1.61E-06	NA		1.09E+00
Total Adult Resident				1.6E-01			1.1E-02			0.0E+00	0.17
Total Child Resident			(95.3% Contribution)	1.5E+00		(4.7% Contribution)	7.3E-02		(0% Contribution)	0.0E+00	1.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-145
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-082
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.45E+01	9.21E-06	1.50E+00	1.38E-05	1.38E-06	1.50E+00	2.07E-06	1.75E-09	1.51E+01	2.63E-08	1.59E-05
Copper	4.68E+03	2.20E-03	NA		8.77E-05	NA		3.34E-07	NA		
Child Resident											
Arsenic	2.45E+01	2.15E-05	1.50E+00	3.22E-05	2.26E-06	1.50E+00	3.38E-06	1.02E-09	1.51E+01	1.54E-08	3.56E-05
Copper	4.68E+03	5.13E-03	NA		1.44E-04	NA		1.95E-07	NA		
Total Adult Resident				1.4E-05			2.1E-06			2.6E-08	1.6E-05
Total Child Resident				3.2E-05			3.4E-06			1.5E-08	3.6E-05
Total Adult/Child Resident		(89.3% Contribution)		4.6E-05	(10.6% Contribution)		5.4E-06	(0.1% Contribution)		4.2E-08	5.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-146
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-07-082
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	2.45E+01	2.68E-05	3.00E-04	8.95E-02	4.02E-06	3.00E-04	1.34E-02	5.10E-09	NA		1.03E-01
Copper	4.68E+03	6.41E-03	4.00E-02	1.60E-01	2.56E-04	4.00E-02	6.39E-03	9.74E-07	NA		1.67E-01
Child Resident											
Arsenic	2.45E+01	2.51E-04	3.00E-04	8.35E-01	2.63E-05	3.00E-04	8.77E-02	1.19E-08	NA		9.23E-01
Copper	4.68E+03	5.98E-02	4.00E-02	1.50E+00	1.68E-03	4.00E-02	4.19E-02	2.27E-06	NA		1.54E+00
Total Adult Resident				2.5E-01			2.0E-02			0.0E+00	0.27
Total Child Resident		(94.7% Contribution)		2.3E+00	(5.3% Contribution)		1.3E-01	(0% Contribution)		0.0E+00	2.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-147
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-09-014
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.00E+01	7.51E-06	1.50E+00	1.13E-05	1.12E-06	1.50E+00	1.69E-06	1.43E-09	1.51E+01	2.15E-08	1.30E-05
Copper	5.18E+03	2.43E-03	NA		9.71E-05	NA		3.70E-07	NA		
Child Resident											
Arsenic	2.00E+01	1.75E-05	1.50E+00	2.63E-05	1.84E-06	1.50E+00	2.76E-06	8.33E-10	1.51E+01	1.25E-08	2.91E-05
Copper	5.18E+03	5.68E-03	NA		1.59E-04	NA		2.16E-07	NA		
Total Adult Resident				1.1E-05			1.7E-06			2.1E-08	1.3E-05
Total Child Resident				2.6E-05			2.8E-06			1.3E-08	2.9E-05
Total Adult/Child Resident		(89.3% Contribution)		3.8E-05	(10.6% Contribution)		4.4E-06	(0.1% Contribution)		3.4E-08	4.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-148
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 11 - Property 101-09-014
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 11, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	2.00E+01	2.19E-05	3.00E-04	7.31E-02	3.28E-06	3.00E-04	1.09E-02	4.16E-09	NA		8.40E-02
Copper	5.18E+03	7.10E-03	4.00E-02	1.77E-01	2.83E-04	4.00E-02	7.08E-03	1.08E-06	NA		1.84E-01
Child Resident											
Arsenic	2.00E+01	2.05E-04	3.00E-04	6.82E-01	2.15E-05	3.00E-04	7.16E-02	9.72E-09	NA		7.53E-01
Copper	5.18E+03	6.62E-02	4.00E-02	1.66E+00	1.85E-03	4.00E-02	4.64E-02	2.52E-06	NA		1.70E+00
Total Adult Resident				2.5E-01			1.8E-02			0.0E+00	0.27
Total Child Resident		(95.2% Contribution)		2.3E+00	(4.8% Contribution)		1.2E-01	(0% Contribution)		0.0E+00	2.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-149
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 11
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-07-065	**Adult Resident**	Arsenic	1.53E+01	8.63E-06	1.29E-06	1.64E-08	9.94E-06	5.59E-02	8.37E-03		6.43E-02
		Copper	2.56E+03					8.76E-02	3.49E-03		9.11E-02
		Total					9.9E-06				0.2
	Child Resident	Arsenic	1.53E+01	2.01E-05	2.11E-06	9.59E-09	2.23E-05	5.22E-01	5.48E-02		5.77E-01
		Copper	2.56E+03					8.17E-01	2.29E-02		8.40E-01
		Total					2.2E-05				1.4
	Adult/Child Resident	Arsenic	1.53E+01	2.88E-05	3.41E-06	2.60E-08	3.22E-05				
		Copper	2.56E+03								
		Total					3.2E-05				NA
101-07-066	**Adult Resident**	Arsenic	1.22E+01	6.88E-06	1.03E-06	1.31E-08	7.92E-06	4.46E-02	6.67E-03		5.12E-02
		Copper	3.31E+03					1.13E-01	4.52E-03		1.18E-01
		Total					7.9E-06				0.2
	Child Resident	Arsenic	1.22E+01	1.60E-05	1.68E-06	7.65E-09	1.77E-05	4.16E-01	4.37E-02		4.60E-01
		Copper	3.31E+03					1.06E+00	2.96E-02		1.09E+00
		Total					1.8E-05				1.5
	Adult/Child Resident	Arsenic	1.22E+01	2.29E-05	2.71E-06	2.08E-08	2.57E-05				
		Copper	3.31E+03								
		Total					2.6E-05				NA
101-07-082	**Adult Resident**	Arsenic	2.45E+01	1.38E-05	2.07E-06	2.63E-08	1.59E-05	8.95E-02	1.34E-02		1.03E-01
		Copper	4.68E+03					1.60E-01	6.39E-03		1.67E-01
		Total					1.6E-05				0.3
	Child Resident	Arsenic	2.45E+01	3.22E-05	3.38E-06	1.54E-08	3.56E-05	8.35E-01	8.77E-02		9.23E-01
		Copper	4.68E+03					1.50E+00	4.19E-02		1.54E+00
		Total					3.6E-05				2.5
	Adult/Child Resident	Arsenic	2.45E+01	4.60E-05	5.45E-06	4.17E-08	5.15E-05				
		Copper	4.68E+03								
		Total					5.2E-05				NA

Table A-149
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 11
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-09-014	**Adult Resident**	Arsenic	2.00E+01	1.13E-05	1.69E-06	2.15E-08	1.30E-05	7.31E-02	1.09E-02		8.40E-02
		Copper	5.18E+03					1.77E-01	7.08E-03		1.84E-01
		Total					1.3E-05				0.3
	Child Resident	Arsenic	2.00E+01	2.63E-05	2.76E-06	1.25E-08	2.91E-05	6.82E-01	7.16E-02		7.53E-01
		Copper	5.18E+03					1.66E+00	4.64E-02		1.70E+00
		Total					2.9E-05				2.5
	Adult/Child Resident	Arsenic	2.00E+01	3.76E-05	4.45E-06	3.40E-08	4.21E-05				
		Copper	5.18E+03								
		Total					4.2E-05				NA

Notes:
NA = Not applicable

Table A-150
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 11
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-07-065	3.2E-05	1.4
101-07-066	2.6E-05	1.5
101-07-082	5.2E-05	2.5
101-09-014	4.2E-05	2.5

Table A-151
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-004
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.67E+01	1.38E-05	1.50E+00	2.07E-05	2.06E-06	1.50E+00	3.09E-06	2.62E-09	1.51E+01	3.94E-08	2.38E-05
Copper	7.32E+03	3.44E-03	NA		1.37E-04	NA		5.22E-07	NA		
Child Resident											
Arsenic	3.67E+01	3.22E-05	1.50E+00	4.83E-05	3.38E-06	1.50E+00	5.07E-06	1.53E-09	1.51E+01	2.30E-08	5.34E-05
Copper	7.32E+03	8.02E-03	NA		2.25E-04	NA		3.05E-07	NA		
Total Adult Resident				2.1E-05			3.1E-06			3.9E-08	2.4E-05
Total Child Resident				4.8E-05			5.1E-06			2.3E-08	5.3E-05
Total Adult/Child Resident		(89.3% Contribution)		6.9E-05	(10.6% Contribution)		8.2E-06	(0.1% Contribution)		6.2E-08	7.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-152
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-004
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.67E+01	4.02E-05	3.00E-04	1.34E-01	6.02E-06	3.00E-04	2.01E-02	7.64E-09	NA		1.54E-01
Copper	7.32E+03	1.00E-02	4.00E-02	2.51E-01	4.00E-04	4.00E-02	1.00E-02	1.52E-06	NA		2.61E-01
Child Resident											
Arsenic	3.67E+01	3.75E-04	3.00E-04	1.25E+00	3.94E-05	3.00E-04	1.31E-01	1.78E-08	NA		1.38E+00
Copper	7.32E+03	9.36E-02	4.00E-02	2.34E+00	2.62E-03	4.00E-02	6.55E-02	3.56E-06	NA		2.41E+00
Total Adult Resident				3.8E-01			3.0E-02			0.0E+00	0.41
Total Child Resident		(94.8% Contribution)		3.6E+00	(5.2% Contribution)		2.0E-01	(0% Contribution)		0.0E+00	3.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-153
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-008
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.76E+01	1.79E-05	1.50E+00	2.68E-05	2.68E-06	1.50E+00	4.01E-06	3.40E-09	1.51E+01	5.11E-08	3.09E-05
Copper	1.08E+04	5.07E-03	NA		2.02E-04	NA		7.71E-07	NA		
Child Resident											
Arsenic	4.76E+01	4.17E-05	1.50E+00	6.26E-05	4.38E-06	1.50E+00	6.57E-06	1.98E-09	1.51E+01	2.98E-08	6.92E-05
Copper	1.08E+04	1.18E-02	NA		3.31E-04	NA		4.50E-07	NA		
Total Adult Resident				2.7E-05			4.0E-06			5.1E-08	3.1E-05
Total Child Resident				6.3E-05			6.6E-06			3.0E-08	6.9E-05
Total Adult/Child Resident		(89.3% Contribution)		8.9E-05	(10.6% Contribution)		1.1E-05	(0.1% Contribution)		8.1E-08	1.0E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-154
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-008
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.76E+01	5.22E-05	3.00E-04	1.74E-01	7.81E-06	3.00E-04	2.60E-02	9.91E-09	NA		2.0E-01
Copper	1.08E+04	1.48E-02	4.00E-02	3.70E-01	5.90E-04	4.00E-02	1.48E-02	2.25E-06	NA		3.8E-01
Child Resident											
Arsenic	4.76E+01	4.87E-04	3.00E-04	1.62E+00	5.11E-05	3.00E-04	1.70E-01	2.31E-08	NA		1.8E+00
Copper	1.08E+04	1.38E-01	4.00E-02	3.45E+00	3.87E-03	4.00E-02	9.67E-02	5.25E-06	NA		3.5E+00
Total Adult Resident				5.4E-01			4.1E-02			0.0E+00	0.58
Total Child Resident			(95% Contribution)	5.1E+00		(5% Contribution)	2.7E-01		(0% Contribution)	0.0E+00	5.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-155
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-010
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.01E+01	1.13E-05	1.50E+00	1.70E-05	1.69E-06	1.50E+00	2.54E-06	2.15E-09	1.51E+01	3.23E-08	1.95E-05
Copper	7.03E+03	3.30E-03	NA		1.32E-04	NA		5.02E-07	NA		
Child Resident											
Arsenic	3.01E+01	2.64E-05	1.50E+00	3.96E-05	2.77E-06	1.50E+00	4.16E-06	1.25E-09	1.51E+01	1.89E-08	4.38E-05
Copper	7.03E+03	7.70E-03	NA		2.16E-04	NA		2.93E-07	NA		
Total Adult Resident				1.7E-05			2.5E-06			3.2E-08	2.0E-05
Total Child Resident				4.0E-05			4.2E-06			1.9E-08	4.4E-05
Total Adult/Child Resident		(89.3% Contribution)		5.7E-05	(10.6% Contribution)		6.7E-06	(0.1% Contribution)		5.1E-08	6.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-156
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-010
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.01E+01	3.30E-05	3.00E-04	1.10E-01	4.94E-06	3.00E-04	1.65E-02	6.27E-09	NA		1.3E-01
Copper	7.03E+03	9.63E-03	4.00E-02	2.41E-01	3.84E-04	4.00E-02	9.61E-03	1.46E-06	NA		2.5E-01
Child Resident											
Arsenic	3.01E+01	3.08E-04	3.00E-04	1.03E+00	3.23E-05	3.00E-04	1.08E-01	1.46E-08	NA		1.1E+00
Copper	7.03E+03	8.99E-02	4.00E-02	2.25E+00	2.52E-03	4.00E-02	6.29E-02	3.41E-06	NA		2.3E+00
Total Adult Resident				3.5E-01			2.6E-02			0.0E+00	0.38
Total Child Resident			(95% Contribution)	3.3E+00		(5% Contribution)	1.7E-01		(0% Contribution)	0.0E+00	3.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-157
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-025A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.99E+01	7.48E-06	1.50E+00	1.12E-05	1.12E-06	1.50E+00	1.68E-06	1.42E-09	1.51E+01	2.14E-08	1.29E-05
Copper	5.97E+03	2.80E-03	NA		1.12E-04	NA		4.26E-07	NA		
Child Resident											
Arsenic	1.99E+01	1.74E-05	1.50E+00	2.62E-05	1.83E-06	1.50E+00	2.75E-06	8.29E-10	1.51E+01	1.25E-08	2.89E-05
Copper	5.97E+03	6.54E-03	NA		1.83E-04	NA		2.49E-07	NA		
Total Adult Resident				1.1E-05			1.7E-06			2.1E-08	1.3E-05
Total Child Resident				2.6E-05			2.7E-06			1.2E-08	2.9E-05
Total Adult/Child Resident		(89.3% Contribution)		3.7E-05	(10.6% Contribution)		4.4E-06	(0.1% Contribution)		3.4E-08	4.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-158
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-025A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.99E+01	2.18E-05	3.00E-04	7.27E-02	3.26E-06	3.00E-04	1.09E-02	4.14E-09	NA		8.4E-02
Copper	5.97E+03	8.18E-03	4.00E-02	2.04E-01	3.26E-04	4.00E-02	8.16E-03	1.24E-06	NA		2.1E-01
Child Resident											
Arsenic	1.99E+01	2.04E-04	3.00E-04	6.78E-01	2.14E-05	3.00E-04	7.12E-02	9.67E-09	NA		7.5E-01
Copper	5.97E+03	7.63E-02	4.00E-02	1.91E+00	2.14E-03	4.00E-02	5.34E-02	2.90E-06	NA		2.0E+00
Total Adult Resident				2.8E-01			1.9E-02			0.0E+00	0.30
Total Child Resident		(95.4% Contribution)		2.6E+00	(4.6% Contribution)		1.2E-01	(0% Contribution)		0.0E+00	2.7

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-159
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-027
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.08E+01	7.82E-06	1.50E+00	1.17E-05	1.17E-06	1.50E+00	1.75E-06	1.48E-09	1.51E+01	2.23E-08	1.35E-05
Copper	4.65E+03	2.18E-03	NA		8.71E-05	NA		3.32E-07	NA		
Child Resident											
Arsenic	2.08E+01	1.82E-05	1.50E+00	2.74E-05	1.91E-06	1.50E+00	2.87E-06	8.66E-10	1.51E+01	1.30E-08	3.02E-05
Copper	4.65E+03	5.10E-03	NA		1.43E-04	NA		1.94E-07	NA		
Total Adult Resident				1.2E-05			1.8E-06			2.2E-08	1.3E-05
Total Child Resident				2.7E-05			2.9E-06			1.3E-08	3.0E-05
Total Adult/Child Resident		(89.3% Contribution)		3.9E-05	(10.6% Contribution)		4.6E-06	(0.1% Contribution)		3.5E-08	4.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-160
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-027
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.08E+01	2.28E-05	3.00E-04	7.60E-02	3.41E-06	3.00E-04	1.14E-02	4.33E-09	NA		8.7E-02
Copper	4.65E+03	6.37E-03	4.00E-02	1.59E-01	2.54E-04	4.00E-02	6.35E-03	9.68E-07	NA		1.7E-01
Child Resident											
Arsenic	2.08E+01	2.13E-04	3.00E-04	7.09E-01	2.23E-05	3.00E-04	7.45E-02	1.01E-08	NA		7.8E-01
Copper	4.65E+03	5.95E-02	4.00E-02	1.49E+00	1.66E-03	4.00E-02	4.16E-02	2.26E-06	NA		1.5E+00
Total Adult Resident				2.4E-01			1.8E-02			0.0E+00	0.25
Total Child Resident			(95% Contribution)	2.2E+00		(5% Contribution)	1.2E-01		(0% Contribution)	0.0E+00	2.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-161
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-032
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.31E+01	1.24E-05	1.50E+00	1.87E-05	1.86E-06	1.50E+00	2.79E-06	2.36E-09	1.51E+01	3.56E-08	2.15E-05
Copper	8.49E+03	3.99E-03	NA		1.59E-04	NA		6.06E-07	NA		
Child Resident											
Arsenic	3.31E+01	2.90E-05	1.50E+00	4.35E-05	3.05E-06	1.50E+00	4.57E-06	1.38E-09	1.51E+01	2.07E-08	4.81E-05
Copper	8.49E+03	9.30E-03	NA		2.61E-04	NA		3.53E-07	NA		
Total Adult Resident				1.9E-05			2.8E-06			3.6E-08	2.1E-05
Total Child Resident				4.4E-05			4.6E-06			2.1E-08	4.8E-05
Total Adult/Child Resident		(89.3% Contribution)		6.2E-05	(10.6% Contribution)		7.4E-06	(0.1% Contribution)		5.6E-08	7.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-162
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-032
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.31E+01	3.63E-05	3.00E-04	1.21E-01	5.43E-06	3.00E-04	1.81E-02	6.89E-09	NA		1.4E-01
Copper	8.49E+03	1.16E-02	4.00E-02	2.91E-01	4.64E-04	4.00E-02	1.16E-02	1.77E-06	NA		3.0E-01
Child Resident											
Arsenic	3.31E+01	3.39E-04	3.00E-04	1.13E+00	3.55E-05	3.00E-04	1.18E-01	1.61E-08	NA		1.2E+00
Copper	8.49E+03	1.09E-01	4.00E-02	2.71E+00	3.04E-03	4.00E-02	7.60E-02	4.12E-06	NA		2.8E+00
Total Adult Resident				4.1E-01			3.0E-02			0.0E+00	0.44
Total Child Resident		(95.2% Contribution)		3.8E+00	(4.8% Contribution)		1.9E-01	(0% Contribution)		0.0E+00	4.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-163
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-033
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.34E+01	2.01E-05	1.50E+00	3.01E-05	3.00E-06	1.50E+00	4.50E-06	3.81E-09	1.51E+01	5.74E-08	3.47E-05
Copper	1.03E+04	4.84E-03	NA		1.93E-04	NA		7.35E-07	NA		
Child Resident											
Arsenic	5.34E+01	4.68E-05	1.50E+00	7.02E-05	4.92E-06	1.50E+00	7.37E-06	2.22E-09	1.51E+01	3.35E-08	7.76E-05
Copper	1.03E+04	1.13E-02	NA		3.16E-04	NA		4.29E-07	NA		
Total Adult Resident				3.0E-05			4.5E-06			5.7E-08	3.5E-05
Total Child Resident				7.0E-05			7.4E-06			3.3E-08	7.8E-05
Total Adult/Child Resident		(89.3% Contribution)		1.0E-04	(10.6% Contribution)		1.2E-05	(0.1% Contribution)		9.1E-08	1.1E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-164
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 12 - Property 101-09-033
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 12, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.34E+01	5.85E-05	3.00E-04	1.95E-01	8.76E-06	3.00E-04	2.92E-02	1.11E-08	NA		2.2E-01
Copper	1.03E+04	1.41E-02	4.00E-02	3.53E-01	5.63E-04	4.00E-02	1.41E-02	2.14E-06	NA		3.7E-01
Child Resident											
Arsenic	5.34E+01	5.46E-04	3.00E-04	1.82E+00	5.74E-05	3.00E-04	1.91E-01	2.59E-08	NA		2.0E+00
Copper	1.03E+04	1.32E-01	4.00E-02	3.29E+00	3.69E-03	4.00E-02	9.22E-02	5.00E-06	NA		3.4E+00
Total Adult Resident				5.5E-01			4.3E-02			0.0E+00	0.59
Total Child Resident		(94.7% Contribution)		5.1E+00	(5.3% Contribution)		2.8E-01	(0% Contribution)		0.0E+00	5.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-165
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 12
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-004	**Adult Resident**	Arsenic	3.67E+01	2.07E-05	3.09E-06	3.94E-08	2.38E-05	1.34E-01	2.01E-02		1.54E-01
		Copper	7.32E+03					2.51E-01	1.00E-02		2.61E-01
		Total					2.4E-05				0.4
	Child Resident	Arsenic	3.67E+01	4.83E-05	5.07E-06	2.30E-08	5.34E-05	1.25E+00	1.31E-01		1.38E+00
		Copper	7.32E+03					2.34E+00	6.55E-02		2.41E+00
		Total					5.3E-05				3.8
	Adult/Child Resident	Arsenic	3.67E+01	6.89E-05	8.16E-06	6.24E-08	7.72E-05				
		Copper	7.32E+03								
		Total					7.7E-05				NA
101-09-008	**Adult Resident**	Arsenic	4.76E+01	2.68E-05	4.01E-06	5.11E-08	3.09E-05	1.74E-01	2.60E-02		2.00E-01
		Copper	1.08E+04					3.70E-01	1.48E-02		3.85E-01
		Total					3.1E-05				0.6
	Child Resident	Arsenic	4.76E+01	6.26E-05	6.57E-06	2.98E-08	6.92E-05	1.62E+00	1.70E-01		1.79E+00
		Copper	1.08E+04					3.45E+00	9.67E-02		3.55E+00
		Total					6.9E-05				5.3
	Adult/Child Resident	Arsenic	4.76E+01	8.94E-05	1.06E-05	8.10E-08	1.00E-04				
		Copper	1.08E+04								
		Total					1.0E-04				NA
101-09-010	**Adult Resident**	Arsenic	3.01E+01	1.70E-05	2.54E-06	3.23E-08	1.95E-05	1.10E-01	1.65E-02		1.26E-01
		Copper	7.03E+03					2.41E-01	9.61E-03		2.50E-01
		Total					2.0E-05				0.4
	Child Resident	Arsenic	3.01E+01	3.96E-05	4.16E-06	1.89E-08	4.38E-05	1.03E+00	1.08E-01		1.13E+00
		Copper	7.03E+03					2.25E+00	6.29E-02		2.31E+00
		Total					4.4E-05				3.4
	Adult/Child Resident	Arsenic	3.01E+01	5.65E-05	6.69E-06	5.12E-08	6.33E-05				
		Copper	7.03E+03								
		Total					6.3E-05				NA

Table A-165
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 12
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-025A	**Adult Resident**	Arsenic	1.99E+01	1.12E-05	1.68E-06	2.14E-08	1.29E-05	7.27E-02	1.09E-02		8.36E-02
		Copper	5.97E+03					2.04E-01	8.16E-03		2.13E-01
		Total					1.3E-05				0.3
	Child Resident	Arsenic	1.99E+01	2.62E-05	2.75E-06	1.25E-08	2.89E-05	6.78E-01	7.12E-02		7.50E-01
		Copper	5.97E+03					1.91E+00	5.34E-02		1.96E+00
		Total					2.9E-05				2.7
	Adult/Child Resident	Arsenic	1.99E+01	3.74E-05	4.43E-06	3.38E-08	4.18E-05				
		Copper	5.97E+03								
		Total					4.2E-05				NA
101-09-027	**Adult Resident**	Arsenic	2.08E+01	1.17E-05	1.75E-06	2.23E-08	1.35E-05	7.60E-02	1.14E-02		8.74E-02
		Copper	4.65E+03					1.59E-01	6.35E-03		1.66E-01
		Total					1.3E-05				0.3
	Child Resident	Arsenic	2.08E+01	2.74E-05	2.87E-06	1.30E-08	3.02E-05	7.09E-01	7.45E-02		7.84E-01
		Copper	4.65E+03					1.49E+00	4.16E-02		1.53E+00
		Total					3.0E-05				2.3
	Adult/Child Resident	Arsenic	2.08E+01	3.91E-05	4.63E-06	3.54E-08	4.37E-05				
		Copper	4.65E+03								
		Total					4.4E-05				NA
101-09-032	**Adult Resident**	Arsenic	3.31E+01	1.87E-05	2.79E-06	3.56E-08	2.15E-05	1.21E-01	1.81E-02		1.39E-01
		Copper	8.49E+03					2.91E-01	1.16E-02		3.02E-01
		Total					2.1E-05				0.4
	Child Resident	Arsenic	3.31E+01	4.35E-05	4.57E-06	2.07E-08	4.81E-05	1.13E+00	1.18E-01		1.25E+00
		Copper	8.49E+03					2.71E+00	7.60E-02		2.79E+00
		Total					4.8E-05				4.0
	Adult/Child Resident	Arsenic	3.31E+01	6.22E-05	7.36E-06	5.63E-08	6.96E-05				
		Copper	8.49E+03								
		Total					7.0E-05				NA

Table A-165
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 12
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-09-033	**Adult Resident**	Arsenic	5.34E+01	3.01E-05	4.50E-06	5.74E-08	3.47E-05	1.95E-01	2.92E-02		2.24E-01
		Copper	1.03E+04					3.53E-01	1.41E-02		3.67E-01
		Total					3.5E-05				0.6
	Child Resident	Arsenic	5.34E+01	7.02E-05	7.37E-06	3.35E-08	7.76E-05	1.82E+00	1.91E-01		2.01E+00
		Copper	1.03E+04					3.29E+00	9.22E-02		3.38E+00
		Total					7.8E-05				5.4
	Adult/Child Resident	Arsenic	5.34E+01	1.00E-04	1.19E-05	9.08E-08	1.12E-04				
		Copper	1.03E+04								
		Total					1.1E-04				NA

Notes:
NA = Not applicable

Table A-166
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 12
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-09-004	7.7E-05	3.8
101-09-008	1.0E-04	5.3
101-09-010	6.3E-05	3.4
101-09-025A	4.2E-05	2.7
101-09-027	4.4E-05	2.3
101-09-032	7.0E-05	4.0
101-09-033	1.1E-04	5.4

Table A-167
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-059
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.38E+01	5.19E-06	1.50E+00	7.78E-06	7.76E-07	1.50E+00	1.16E-06	9.85E-10	1.51E+01	1.48E-08	8.96E-06
Copper	5.52E+03	2.59E-03	NA		1.03E-04	NA		3.94E-07	NA		
Child Resident											
Arsenic	1.38E+01	1.21E-05	1.50E+00	1.81E-05	1.27E-06	1.50E+00	1.91E-06	5.75E-10	1.51E+01	8.65E-09	2.01E-05
Copper	5.52E+03	6.05E-03	NA		1.69E-04	NA		2.30E-07	NA		
Total Adult Resident				7.8E-06			1.2E-06			1.5E-08	9.0E-06
Total Child Resident				1.8E-05			1.9E-06			8.6E-09	2.0E-05
Total Adult/Child Resident		(89.3% Contribution)		2.6E-05	(10.6% Contribution)		3.1E-06	(0.1% Contribution)		2.3E-08	2.9E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-168
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-059
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.38E+01	1.51E-05	3.00E-04	5.04E-02	2.26E-06	3.00E-04	7.54E-03	2.87E-09	NA		5.80E-02
Copper	5.52E+03	7.56E-03	4.00E-02	1.89E-01	3.02E-04	4.00E-02	7.54E-03	1.15E-06	NA		1.97E-01
Child Resident											
Arsenic	1.38E+01	1.41E-04	3.00E-04	4.71E-01	1.48E-05	3.00E-04	4.94E-02	6.70E-09	NA		5.20E-01
Copper	5.52E+03	7.06E-02	4.00E-02	1.76E+00	1.98E-03	4.00E-02	4.94E-02	2.68E-06	NA		1.81E+00
Total Adult Resident				2.4E-01			1.5E-02			0.0E+00	0.25
Total Child Resident			(95.8% Contribution)	2.2E+00		(4.2% Contribution)	9.9E-02		(0% Contribution)	0.0E+00	2.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-169
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-062
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.44E+01	9.17E-06	1.50E+00	1.38E-05	1.37E-06	1.50E+00	2.06E-06	1.74E-09	1.51E+01	2.62E-08	1.58E-05
Copper	4.59E+03	2.16E-03	NA		8.60E-05	NA		3.28E-07	NA		
Child Resident											
Arsenic	2.44E+01	2.14E-05	1.50E+00	3.21E-05	2.25E-06	1.50E+00	3.37E-06	1.02E-09	1.51E+01	1.53E-08	3.55E-05
Copper	4.59E+03	5.03E-03	NA		1.41E-04	NA		1.91E-07	NA		
Total Adult Resident				1.4E-05			2.1E-06			2.6E-08	1.6E-05
Total Child Resident				3.2E-05			3.4E-06			1.5E-08	3.5E-05
Total Adult/Child Resident		(89.3% Contribution)		4.6E-05	(10.6% Contribution)		5.4E-06	(0.1% Contribution)		4.2E-08	5.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-170
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-062
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.44E+01	2.67E-05	3.00E-04	8.91E-02	4.00E-06	3.00E-04	1.33E-02	5.08E-09	NA		1.02E-01
Copper	4.59E+03	6.29E-03	4.00E-02	1.57E-01	2.51E-04	4.00E-02	6.27E-03	9.56E-07	NA		1.63E-01
Child Resident											
Arsenic	2.44E+01	2.50E-04	3.00E-04	8.32E-01	2.62E-05	3.00E-04	8.73E-02	1.19E-08	NA		9.19E-01
Copper	4.59E+03	5.87E-02	4.00E-02	1.47E+00	1.64E-03	4.00E-02	4.11E-02	2.23E-06	NA		1.51E+00
Total Adult Resident				2.5E-01			2.0E-02			0.0E+00	0.27
Total Child Resident		(94.7% Contribution)		2.3E+00	(5.3% Contribution)		1.3E-01	(0% Contribution)		0.0E+00	2.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-171
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-064
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.27E+01	1.60E-05	1.50E+00	2.41E-05	2.40E-06	1.50E+00	3.60E-06	3.05E-09	1.51E+01	4.59E-08	2.77E-05
Copper	1.11E+04	5.21E-03	NA		2.08E-04	NA		7.92E-07	NA		
Child Resident											
Arsenic	4.27E+01	3.74E-05	1.50E+00	5.62E-05	3.93E-06	1.50E+00	5.90E-06	1.78E-09	1.51E+01	2.68E-08	6.21E-05
Copper	1.11E+04	1.22E-02	NA		3.41E-04	NA		4.62E-07	NA		
Total Adult Resident				2.4E-05			3.6E-06			4.6E-08	2.8E-05
Total Child Resident				5.6E-05			5.9E-06			2.7E-08	6.2E-05
Total Adult/Child Resident		(89.3% Contribution)		8.0E-05	(10.6% Contribution)		9.5E-06	(0.1% Contribution)		7.3E-08	9.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-172
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-064
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.27E+01	4.68E-05	3.00E-04	1.56E-01	7.00E-06	3.00E-04	2.33E-02	8.89E-09	NA		1.79E-01
Copper	1.11E+04	1.52E-02	4.00E-02	3.80E-01	6.07E-04	4.00E-02	1.52E-02	2.31E-06	NA		3.95E-01
Child Resident											
Arsenic	4.27E+01	4.37E-04	3.00E-04	1.46E+00	4.59E-05	3.00E-04	1.53E-01	2.07E-08	NA		1.61E+00
Copper	1.11E+04	1.42E-01	4.00E-02	3.55E+00	3.97E-03	4.00E-02	9.93E-02	5.39E-06	NA		3.65E+00
Total Adult Resident				5.4E-01			3.9E-02			0.0E+00	0.57
Total Child Resident		(95.2% Contribution)		5.0E+00	(4.8% Contribution)		2.5E-01	(0% Contribution)		0.0E+00	5.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-173
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-067
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.70E+01	1.39E-05	1.50E+00	2.09E-05	2.08E-06	1.50E+00	3.12E-06	2.64E-09	1.51E+01	3.97E-08	2.40E-05
Copper	5.97E+03	2.80E-03	NA		1.12E-04	NA		4.26E-07	NA		
Child Resident											
Arsenic	3.70E+01	3.24E-05	1.50E+00	4.87E-05	3.41E-06	1.50E+00	5.11E-06	1.54E-09	1.51E+01	2.32E-08	5.38E-05
Copper	5.97E+03	6.54E-03	NA		1.83E-04	NA		2.49E-07	NA		
Total Adult Resident				2.1E-05			3.1E-06			4.0E-08	2.4E-05
Total Child Resident				4.9E-05			5.1E-06			2.3E-08	5.4E-05
Total Adult/Child Resident		(89.3% Contribution)		7.0E-05	(10.6% Contribution)		8.2E-06	(0.1% Contribution)		6.3E-08	7.8E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-174
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-067
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.70E+01	4.05E-05	3.00E-04	1.35E-01	6.07E-06	3.00E-04	2.02E-02	7.70E-09	NA		1.6E-01
Copper	5.97E+03	8.18E-03	4.00E-02	2.04E-01	3.26E-04	4.00E-02	8.16E-03	1.24E-06	NA		2.1E-01
Child Resident											
Arsenic	3.70E+01	3.78E-04	3.00E-04	1.26E+00	3.97E-05	3.00E-04	1.32E-01	1.80E-08	NA		1.4E+00
Copper	5.97E+03	7.63E-02	4.00E-02	1.91E+00	2.14E-03	4.00E-02	5.34E-02	2.90E-06	NA		2.0E+00
Total Adult Resident				3.4E-01			2.8E-02			0.0E+00	0.37
Total Child Resident		(94.5% Contribution)		3.2E+00	(5.5% Contribution)		1.9E-01	(0% Contribution)		0.0E+00	3.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-175
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-068
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.07E+01	7.78E-06	1.50E+00	1.17E-05	1.16E-06	1.50E+00	1.75E-06	1.48E-09	1.51E+01	2.22E-08	1.34E-05
Copper	4.13E+03	1.94E-03	NA		7.74E-05	NA		2.95E-07	NA		
Child Resident											
Arsenic	2.07E+01	1.81E-05	1.50E+00	2.72E-05	1.91E-06	1.50E+00	2.86E-06	8.62E-10	1.51E+01	1.30E-08	3.01E-05
Copper	4.13E+03	4.53E-03	NA		1.27E-04	NA		1.72E-07	NA		
Total Adult Resident				1.2E-05			1.7E-06			2.2E-08	1.3E-05
Total Child Resident				2.7E-05			2.9E-06			1.3E-08	3.0E-05
Total Adult/Child Resident		(89.3% Contribution)		3.9E-05	(10.6% Contribution)		4.6E-06	(0.1% Contribution)		3.5E-08	4.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-176
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-068
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.07E+01	2.27E-05	3.00E-04	7.56E-02	3.39E-06	3.00E-04	1.13E-02	4.31E-09	NA		8.7E-02
Copper	4.13E+03	5.66E-03	4.00E-02	1.41E-01	2.26E-04	4.00E-02	5.64E-03	8.60E-07	NA		1.5E-01
Child Resident											
Arsenic	2.07E+01	2.12E-04	3.00E-04	7.06E-01	2.22E-05	3.00E-04	7.41E-02	1.01E-08	NA		7.8E-01
Copper	4.13E+03	5.28E-02	4.00E-02	1.32E+00	1.48E-03	4.00E-02	3.70E-02	2.01E-06	NA		1.4E+00
Total Adult Resident				2.2E-01			1.7E-02			0.0E+00	0.23
Total Child Resident			(94.8% Contribution)	2.0E+00		(5.2% Contribution)	1.1E-01		(0% Contribution)	0.0E+00	2.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-177
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-070
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.59E+01	9.73E-06	1.50E+00	1.46E-05	1.46E-06	1.50E+00	2.18E-06	1.85E-09	1.51E+01	2.78E-08	1.68E-05
Copper	8.51E+03	4.00E-03	NA		1.59E-04	NA		6.07E-07	NA		
Child Resident											
Arsenic	2.59E+01	2.27E-05	1.50E+00	3.41E-05	2.38E-06	1.50E+00	3.58E-06	1.08E-09	1.51E+01	1.62E-08	3.77E-05
Copper	8.51E+03	9.33E-03	NA		2.61E-04	NA		3.54E-07	NA		
Total Adult Resident				1.5E-05			2.2E-06			2.8E-08	1.7E-05
Total Child Resident				3.4E-05			3.6E-06			1.6E-08	3.8E-05
Total Adult/Child Resident		(89.3% Contribution)		4.9E-05	(10.6% Contribution)		5.8E-06	(0.1% Contribution)		4.4E-08	5.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-178
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-070
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.59E+01	2.84E-05	3.00E-04	9.46E-02	4.25E-06	3.00E-04	1.42E-02	5.39E-09	NA		1.1E-01
Copper	8.51E+03	1.17E-02	4.00E-02	2.91E-01	4.65E-04	4.00E-02	1.16E-02	1.77E-06	NA		3.0E-01
Child Resident											
Arsenic	2.59E+01	2.65E-04	3.00E-04	8.83E-01	2.78E-05	3.00E-04	9.27E-02	1.26E-08	NA		9.8E-01
Copper	8.51E+03	1.09E-01	4.00E-02	2.72E+00	3.05E-03	4.00E-02	7.62E-02	4.13E-06	NA		2.8E+00
Total Adult Resident				3.9E-01			2.6E-02			0.0E+00	0.41
Total Child Resident			(95.5% Contribution)	3.6E+00		(4.5% Contribution)	1.7E-01		(0% Contribution)	0.0E+00	3.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-179
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-072
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.90E+01	1.09E-05	1.50E+00	1.63E-05	1.63E-06	1.50E+00	2.45E-06	2.07E-09	1.51E+01	3.12E-08	1.88E-05
Copper	8.43E+03	3.96E-03	NA		1.58E-04	NA		6.02E-07	NA		
Child Resident											
Arsenic	2.90E+01	2.54E-05	1.50E+00	3.81E-05	2.67E-06	1.50E+00	4.00E-06	1.21E-09	1.51E+01	1.82E-08	4.22E-05
Copper	8.43E+03	9.24E-03	NA		2.59E-04	NA		3.51E-07	NA		
Total Adult Resident				1.6E-05			2.4E-06			3.1E-08	1.9E-05
Total Child Resident				3.8E-05			4.0E-06			1.8E-08	4.2E-05
Total Adult/Child Resident		(89.3% Contribution)		5.4E-05	(10.6% Contribution)		6.4E-06	(0.1% Contribution)		4.9E-08	6.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-180
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 13 - Property 101-09-072
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 13, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.90E+01	3.18E-05	3.00E-04	1.06E-01	4.76E-06	3.00E-04	1.59E-02	6.04E-09	NA		1.2E-01
Copper	8.43E+03	1.15E-02	4.00E-02	2.89E-01	4.61E-04	4.00E-02	1.15E-02	1.76E-06	NA		3.0E-01
Child Resident											
Arsenic	2.90E+01	2.97E-04	3.00E-04	9.89E-01	3.11E-05	3.00E-04	1.04E-01	1.41E-08	NA		1.1E+00
Copper	8.43E+03	1.08E-01	4.00E-02	2.69E+00	3.02E-03	4.00E-02	7.54E-02	4.10E-06	NA		2.8E+00
Total Adult Resident				3.9E-01			2.7E-02			0.0E+00	0.42
Total Child Resident		(95.4% Contribution)		3.7E+00	(4.6% Contribution)		1.8E-01	(0% Contribution)		0.0E+00	3.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-181
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 13
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-059	**Adult Resident**	Arsenic	1.38E+01	7.78E-06	1.16E-06	1.48E-08	8.96E-06	5.04E-02	7.54E-03		5.80E-02
		Copper	5.52E+03					1.89E-01	7.54E-03		1.97E-01
		Total					9.0E-06				0.3
	Child Resident	Arsenic	1.38E+01	1.81E-05	1.91E-06	8.65E-09	2.01E-05	4.71E-01	4.94E-02		5.20E-01
		Copper	5.52E+03					1.76E+00	4.94E-02		1.81E+00
		Total					2.0E-05				2.3
	Adult/Child Resident	Arsenic	1.38E+01	2.59E-05	3.07E-06	2.35E-08	2.90E-05				
		Copper	5.52E+03								
		Total					2.9E-05				NA
101-09-062	**Adult Resident**	Arsenic	2.44E+01	1.38E-05	2.06E-06	2.62E-08	1.58E-05	8.91E-02	1.33E-02		1.02E-01
		Copper	4.59E+03					1.57E-01	6.27E-03		1.63E-01
		Total					1.6E-05				0.3
	Child Resident	Arsenic	2.44E+01	3.21E-05	3.37E-06	1.53E-08	3.55E-05	8.32E-01	8.73E-02		9.19E-01
		Copper	4.59E+03					1.47E+00	4.11E-02		1.51E+00
		Total					3.5E-05				2.4
	Adult/Child Resident	Arsenic	2.44E+01	4.58E-05	5.43E-06	4.15E-08	5.13E-05				
		Copper	4.59E+03								
		Total					5.1E-05				NA
101-09-064	**Adult Resident**	Arsenic	4.27E+01	2.41E-05	3.60E-06	4.59E-08	2.77E-05	1.56E-01	2.33E-02		1.79E-01
		Copper	1.11E+04					3.80E-01	1.52E-02		3.95E-01
		Total					2.8E-05				0.6
	Child Resident	Arsenic	4.27E+01	5.62E-05	5.90E-06	2.68E-08	6.21E-05	1.46E+00	1.53E-01		1.61E+00
		Copper	1.11E+04					3.55E+00	9.93E-02		3.65E+00
		Total					6.2E-05				5.3
	Adult/Child Resident	Arsenic	4.27E+01	8.02E-05	9.50E-06	7.26E-08	8.98E-05				
		Copper	1.11E+04								
		Total					9.0E-05				NA

Table A-181
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 13
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-067	**Adult Resident**	Arsenic	3.70E+01	2.09E-05	3.12E-06	3.97E-08	2.40E-05	1.35E-01	2.02E-02		1.55E-01
		Copper	5.97E+03					2.04E-01	8.16E-03		2.13E-01
		Total					2.4E-05				0.4
	Child Resident	Arsenic	3.70E+01	4.87E-05	5.11E-06	2.32E-08	5.38E-05	1.26E+00	1.32E-01		1.39E+00
		Copper	5.97E+03					1.91E+00	5.34E-02		1.96E+00
		Total					5.4E-05				3.4
	Adult/Child Resident	Arsenic	3.70E+01	6.95E-05	8.23E-06	6.29E-08	7.78E-05				
		Copper	5.97E+03								
		Total					7.8E-05				NA
101-09-068	**Adult Resident**	Arsenic	2.07E+01	1.17E-05	1.75E-06	2.22E-08	1.34E-05	7.56E-02	1.13E-02		8.69E-02
		Copper	4.13E+03					1.41E-01	5.64E-03		1.47E-01
		Total					1.3E-05				0.2
	Child Resident	Arsenic	2.07E+01	2.72E-05	2.86E-06	1.30E-08	3.01E-05	7.06E-01	7.41E-02		7.80E-01
		Copper	4.13E+03					1.32E+00	3.70E-02		1.36E+00
		Total					3.0E-05				2.1
	Adult/Child Resident	Arsenic	2.07E+01	3.89E-05	4.60E-06	3.52E-08	4.35E-05				
		Copper	4.13E+03								
		Total					4.4E-05				NA
101-09-070	**Adult Resident**	Arsenic	2.59E+01	1.46E-05	2.18E-06	2.78E-08	1.68E-05	9.46E-02	1.42E-02		1.09E-01
		Copper	8.51E+03					2.91E-01	1.16E-02		3.03E-01
		Total					1.7E-05				0.4
	Child Resident	Arsenic	2.59E+01	3.41E-05	3.58E-06	1.62E-08	3.77E-05	8.83E-01	9.27E-02		9.76E-01
		Copper	8.51E+03					2.72E+00	7.62E-02		2.80E+00
		Total					3.8E-05				3.8
	Adult/Child Resident	Arsenic	2.59E+01	4.87E-05	5.76E-06	4.41E-08	5.45E-05				
		Copper	8.51E+03								
		Total					5.4E-05				NA

Table A-181
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 13
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-09-072	**Adult Resident**	Arsenic	2.90E+01	1.63E-05	2.45E-06	3.12E-08	1.88E-05	1.06E-01	1.59E-02		1.22E-01
		Copper	8.43E+03					2.89E-01	1.15E-02		3.00E-01
		Total					1.9E-05				0.4
	Child Resident	Arsenic	2.90E+01	3.81E-05	4.00E-06	1.82E-08	4.22E-05	9.89E-01	1.04E-01		1.09E+00
		Copper	8.43E+03					2.69E+00	7.54E-02		2.77E+00
		Total					4.2E-05				3.9
	Adult/Child Resident	Arsenic	2.90E+01	5.45E-05	6.45E-06	4.93E-08	6.10E-05				
		Copper	8.43E+03								
		Total					6.1E-05				NA

Notes:
NA = Not applicable

Table A-182
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 13
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-09-059	2.9E-05	2.3
101-09-062	5.1E-05	2.4
101-09-064	9.0E-05	5.3
101-09-067	7.8E-05	3.4
101-09-068	4.4E-05	2.1
101-09-070	5.4E-05	3.8
101-09-072	6.1E-05	3.9

Table A-183
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-036
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.21E+01	1.21E-05	1.50E+00	1.81E-05	1.80E-06	1.50E+00	2.71E-06	2.29E-09	1.51E+01	3.45E-08	2.08E-05
Copper	7.00E+03	3.29E-03	NA		1.31E-04	NA		5.00E-07	NA		
Child Resident											
Arsenic	3.21E+01	2.81E-05	1.50E+00	4.22E-05	2.95E-06	1.50E+00	4.43E-06	1.34E-09	1.51E+01	2.01E-08	4.67E-05
Copper	7.00E+03	7.67E-03	NA		2.15E-04	NA		2.91E-07	NA		
Total Adult Resident				1.8E-05			2.7E-06			3.4E-08	2.1E-05
Total Child Resident				4.2E-05			4.4E-06			2.0E-08	4.7E-05
Total Adult/Child Resident		(89.3% Contribution)		6.0E-05	(10.6% Contribution)		7.1E-06	(0.1% Contribution)		5.5E-08	6.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-184
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-036
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.21E+01	3.52E-05	3.00E-04	1.17E-01	5.26E-06	3.00E-04	1.75E-02	6.68E-09	NA		1.35E-01
Copper	7.00E+03	9.59E-03	4.00E-02	2.40E-01	3.83E-04	4.00E-02	9.57E-03	1.46E-06	NA		2.49E-01
Child Resident											
Arsenic	3.21E+01	3.28E-04	3.00E-04	1.09E+00	3.45E-05	3.00E-04	1.15E-01	1.56E-08	NA		1.21E+00
Copper	7.00E+03	8.95E-02	4.00E-02	2.24E+00	2.51E-03	4.00E-02	6.26E-02	3.40E-06	NA		2.30E+00
Total Adult Resident				3.6E-01			2.7E-02			0.0E+00	0.38
Total Child Resident			(94.9% Contribution)	3.3E+00		(5.1% Contribution)	1.8E-01		(0% Contribution)	0.0E+00	3.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-185
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-038
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	7.87E+01	2.96E-05	1.50E+00	4.44E-05	4.42E-06	1.50E+00	6.64E-06	5.62E-09	1.51E+01	8.45E-08	5.11E-05
Copper	1.43E+04	6.72E-03	NA		2.68E-04	NA		1.02E-06	NA		
Child Resident											
Arsenic	7.87E+01	6.90E-05	1.50E+00	1.03E-04	7.24E-06	1.50E+00	1.09E-05	3.28E-09	1.51E+01	4.93E-08	1.14E-04
Copper	1.43E+04	1.57E-02	NA		4.39E-04	NA		5.95E-07	NA		
Total Adult Resident				4.4E-05			6.6E-06			8.5E-08	5.1E-05
Total Child Resident				1.0E-04			1.1E-05			4.9E-08	1.1E-04
Total Adult/Child Resident			(89.3% Contribution)	1.5E-04		(10.6% Contribution)	1.8E-05		(0.1% Contribution)	1.3E-07	1.7E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-186
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-038
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	7.87E+01	8.62E-05	3.00E-04	2.87E-01	1.29E-05	3.00E-04	4.30E-02	1.64E-08	NA		3.3E-01
Copper	1.43E+04	1.96E-02	4.00E-02	4.90E-01	7.82E-04	4.00E-02	1.95E-02	2.98E-06	NA		5.1E-01
Child Resident											
Arsenic	7.87E+01	8.05E-04	3.00E-04	2.68E+00	8.45E-05	3.00E-04	2.82E-01	3.82E-08	NA		3.0E+00
Copper	1.43E+04	1.83E-01	4.00E-02	4.57E+00	5.12E-03	4.00E-02	1.28E-01	6.95E-06	NA		4.7E+00
Total Adult Resident				7.8E-01			6.3E-02			0.0E+00	0.84
Total Child Resident			(94.7% Contribution)	7.3E+00		(5.3% Contribution)	4.1E-01		(0% Contribution)	0.0E+00	7.7

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-187
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-039
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.23E+01	8.38E-06	1.50E+00	1.26E-05	1.25E-06	1.50E+00	1.88E-06	1.59E-09	1.51E+01	2.40E-08	1.45E-05
Copper	6.89E+03	3.24E-03	NA		1.29E-04	NA		4.92E-07	NA		
Child Resident											
Arsenic	2.23E+01	1.96E-05	1.50E+00	2.93E-05	2.05E-06	1.50E+00	3.08E-06	9.29E-10	1.51E+01	1.40E-08	3.24E-05
Copper	6.89E+03	7.55E-03	NA		2.11E-04	NA		2.87E-07	NA		
Total Adult Resident				1.3E-05			1.9E-06			2.4E-08	1.4E-05
Total Child Resident				2.9E-05			3.1E-06			1.4E-08	3.2E-05
Total Adult/Child Resident			(89.3% Contribution)	4.2E-05		(10.6% Contribution)	5.0E-06		(0.1% Contribution)	3.8E-08	4.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-188
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-039
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.23E+01	2.44E-05	3.00E-04	8.15E-02	3.66E-06	3.00E-04	1.22E-02	4.64E-09	NA		9.4E-02
Copper	6.89E+03	9.44E-03	4.00E-02	2.36E-01	3.77E-04	4.00E-02	9.41E-03	1.43E-06	NA		2.5E-01
Child Resident											
Arsenic	2.23E+01	2.28E-04	3.00E-04	7.60E-01	2.39E-05	3.00E-04	7.98E-02	1.08E-08	NA		8.4E-01
Copper	6.89E+03	8.81E-02	4.00E-02	2.20E+00	2.47E-03	4.00E-02	6.17E-02	3.35E-06	NA		2.3E+00
Total Adult Resident				3.2E-01			2.2E-02			0.0E+00	0.34
Total Child Resident			(95.4% Contribution)	3.0E+00		(4.6% Contribution)	1.4E-01		(0% Contribution)	0.0E+00	3.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-189
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-042
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.77E+01	6.65E-06	1.50E+00	9.98E-06	9.95E-07	1.50E+00	1.49E-06	1.26E-09	1.51E+01	1.90E-08	1.15E-05
Copper	4.96E+03	2.33E-03	NA		9.29E-05	NA		3.54E-07	NA		
Child Resident											
Arsenic	1.77E+01	1.55E-05	1.50E+00	2.33E-05	1.63E-06	1.50E+00	2.44E-06	7.37E-10	1.51E+01	1.11E-08	2.57E-05
Copper	4.96E+03	5.44E-03	NA		1.52E-04	NA		2.07E-07	NA		
Total Adult Resident				1.0E-05			1.5E-06			1.9E-08	1.1E-05
Total Child Resident				2.3E-05			2.4E-06			1.1E-08	2.6E-05
Total Adult/Child Resident			(89.3% Contribution)	3.3E-05		(10.6% Contribution)	3.9E-06		(0.1% Contribution)	3.0E-08	3.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-190
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-042
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.77E+01	1.94E-05	3.00E-04	6.47E-02	2.90E-06	3.00E-04	9.67E-03	3.68E-09	NA		7.4E-02
Copper	4.96E+03	6.79E-03	4.00E-02	1.70E-01	2.71E-04	4.00E-02	6.78E-03	1.03E-06	NA		1.8E-01
Child Resident											
Arsenic	1.77E+01	1.81E-04	3.00E-04	6.03E-01	1.90E-05	3.00E-04	6.34E-02	8.60E-09	NA		6.7E-01
Copper	4.96E+03	6.34E-02	4.00E-02	1.59E+00	1.78E-03	4.00E-02	4.44E-02	2.41E-06	NA		1.6E+00
Total Adult Resident				2.3E-01			1.6E-02			0.0E+00	0.25
Total Child Resident			(95.3% Contribution)	2.2E+00		(4.7% Contribution)	1.1E-01		(0% Contribution)	0.0E+00	2.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-191
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-045
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.26E+01	8.49E-06	1.50E+00	1.27E-05	1.27E-06	1.50E+00	1.91E-06	1.61E-09	1.51E+01	2.43E-08	1.47E-05
Copper	5.01E+03	2.35E-03	NA		9.39E-05	NA		3.58E-07	NA		
Child Resident											
Arsenic	2.26E+01	1.98E-05	1.50E+00	2.97E-05	2.08E-06	1.50E+00	3.12E-06	9.41E-10	1.51E+01	1.42E-08	3.29E-05
Copper	5.01E+03	5.49E-03	NA		1.54E-04	NA		2.09E-07	NA		
Total Adult Resident				1.3E-05			1.9E-06			2.4E-08	1.5E-05
Total Child Resident				3.0E-05			3.1E-06			1.4E-08	3.3E-05
Total Adult/Child Resident			(89.3% Contribution)	4.2E-05		(10.6% Contribution)	5.0E-06		(0.1% Contribution)	3.8E-08	4.8E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-192
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-045
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.26E+01	2.48E-05	3.00E-04	8.26E-02	3.71E-06	3.00E-04	1.24E-02	4.71E-09	NA		9.5E-02
Copper	5.01E+03	6.86E-03	4.00E-02	1.72E-01	2.74E-04	4.00E-02	6.85E-03	1.04E-06	NA		1.8E-01
Child Resident											
Arsenic	2.26E+01	2.31E-04	3.00E-04	7.71E-01	2.43E-05	3.00E-04	8.09E-02	1.10E-08	NA		8.5E-01
Copper	5.01E+03	6.41E-02	4.00E-02	1.60E+00	1.79E-03	4.00E-02	4.48E-02	2.43E-06	NA		1.6E+00
Total Adult Resident				2.5E-01			1.9E-02			0.0E+00	0.27
Total Child Resident			(95% Contribution)	2.4E+00		(5% Contribution)	1.3E-01		(0% Contribution)	0.0E+00	2.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-193
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-047
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.22E+01	8.34E-06	1.50E+00	1.25E-05	1.25E-06	1.50E+00	1.87E-06	1.58E-09	1.51E+01	2.38E-08	1.44E-05
Copper	7.33E+03	3.44E-03	NA		1.37E-04	NA		5.23E-07	NA		
Child Resident											
Arsenic	2.22E+01	1.95E-05	1.50E+00	2.92E-05	2.04E-06	1.50E+00	3.07E-06	9.24E-10	1.51E+01	1.39E-08	3.23E-05
Copper	7.33E+03	8.03E-03	NA		2.25E-04	NA		3.05E-07	NA		
Total Adult Resident				1.3E-05			1.9E-06			2.4E-08	1.4E-05
Total Child Resident				2.9E-05			3.1E-06			1.4E-08	3.2E-05
Total Adult/Child Resident			(89.3% Contribution)	4.2E-05		(10.6% Contribution)	4.9E-06		(0.1% Contribution)	3.8E-08	4.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-194
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-047
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.22E+01	2.43E-05	3.00E-04	8.11E-02	3.64E-06	3.00E-04	1.21E-02	4.62E-09	NA		9.3E-02
Copper	7.33E+03	1.00E-02	4.00E-02	2.51E-01	4.01E-04	4.00E-02	1.00E-02	1.53E-06	NA		2.6E-01
Child Resident											
Arsenic	2.22E+01	2.27E-04	3.00E-04	7.57E-01	2.38E-05	3.00E-04	7.95E-02	1.08E-08	NA		8.4E-01
Copper	7.33E+03	9.37E-02	4.00E-02	2.34E+00	2.62E-03	4.00E-02	6.56E-02	3.56E-06	NA		2.4E+00
Total Adult Resident				3.3E-01			2.2E-02			0.0E+00	0.35
Total Child Resident			(95.5% Contribution)	3.1E+00		(4.5% Contribution)	1.5E-01		(0% Contribution)	0.0E+00	3.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-195
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-054
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.57E+01	9.66E-06	1.50E+00	1.45E-05	1.44E-06	1.50E+00	2.17E-06	1.83E-09	1.51E+01	2.76E-08	1.67E-05
Copper	7.48E+03	3.51E-03	NA		1.40E-04	NA		5.34E-07	NA		
Child Resident											
Arsenic	2.57E+01	2.25E-05	1.50E+00	3.38E-05	2.37E-06	1.50E+00	3.55E-06	1.07E-09	1.51E+01	1.61E-08	3.74E-05
Copper	7.48E+03	8.20E-03	NA		2.30E-04	NA		3.11E-07	NA		
Total Adult Resident				1.4E-05			2.2E-06			2.8E-08	1.7E-05
Total Child Resident				3.4E-05			3.5E-06			1.6E-08	3.7E-05
Total Adult/Child Resident			(89.3% Contribution)	4.8E-05		(10.6% Contribution)	5.7E-06		(0.1% Contribution)	4.4E-08	5.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-196
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-054
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.57E+01	2.82E-05	3.00E-04	9.39E-02	4.21E-06	3.00E-04	1.40E-02	5.35E-09	NA		1.1E-01
Copper	7.48E+03	1.02E-02	4.00E-02	2.56E-01	4.09E-04	4.00E-02	1.02E-02	1.56E-06	NA		2.7E-01
Child Resident											
Arsenic	2.57E+01	2.63E-04	3.00E-04	8.76E-01	2.76E-05	3.00E-04	9.20E-02	1.25E-08	NA		9.7E-01
Copper	7.48E+03	9.56E-02	4.00E-02	2.39E+00	2.68E-03	4.00E-02	6.69E-02	3.63E-06	NA		2.5E+00
Total Adult Resident				3.5E-01			2.4E-02			0.0E+00	0.37
Total Child Resident			(95.4% Contribution)	3.3E+00		(4.6% Contribution)	1.6E-01		(0% Contribution)	0.0E+00	3.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-197
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-077
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.57E+01	1.72E-05	1.50E+00	2.58E-05	2.57E-06	1.50E+00	3.85E-06	3.26E-09	1.51E+01	4.91E-08	2.97E-05
Copper	6.55E+03	3.08E-03	NA		1.23E-04	NA		4.68E-07	NA		
Child Resident											
Arsenic	4.57E+01	4.01E-05	1.50E+00	6.01E-05	4.21E-06	1.50E+00	6.31E-06	1.90E-09	1.51E+01	2.86E-08	6.64E-05
Copper	6.55E+03	7.18E-03	NA		2.01E-04	NA		2.73E-07	NA		
Total Adult Resident				2.6E-05			3.9E-06			4.9E-08	3.0E-05
Total Child Resident				6.0E-05			6.3E-06			2.9E-08	6.6E-05
Total Adult/Child Resident		(89.3% Contribution)		8.6E-05	(10.6% Contribution)		1.0E-05	(0.1% Contribution)		7.8E-08	9.6E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-198
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 14 - Property 101-09-077
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 14, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.57E+01	5.01E-05	3.00E-04	1.67E-01	7.49E-06	3.00E-04	2.50E-02	9.51E-09	NA		1.9E-01
Copper	6.55E+03	8.97E-03	4.00E-02	2.24E-01	3.58E-04	4.00E-02	8.95E-03	1.36E-06	NA		2.3E-01
Child Resident											
Arsenic	4.57E+01	4.67E-04	3.00E-04	1.56E+00	4.91E-05	3.00E-04	1.64E-01	2.22E-08	NA		1.7E+00
Copper	6.55E+03	8.37E-02	4.00E-02	2.09E+00	2.34E-03	4.00E-02	5.86E-02	3.18E-06	NA		2.2E+00
Total Adult Resident				3.9E-01			3.4E-02			0.0E+00	0.43
Total Child Resident			(94.3% Contribution)	3.7E+00		(5.7% Contribution)	2.2E-01		(0% Contribution)	0.0E+00	3.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-199
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 14
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-036	**Adult Resident**	Arsenic	3.21E+01	1.81E-05	2.71E-06	3.45E-08	2.08E-05	1.17E-01	1.75E-02		1.35E-01
		Copper	7.00E+03					2.40E-01	9.57E-03		2.49E-01
		Total					2.1E-05				0.4
	Child Resident	Arsenic	3.21E+01	4.22E-05	4.43E-06	2.01E-08	4.67E-05	1.09E+00	1.15E-01		1.21E+00
		Copper	7.00E+03					2.24E+00	6.26E-02		2.30E+00
		Total					4.7E-05				3.5
	Adult/Child Resident	Arsenic	3.21E+01	6.03E-05	7.14E-06	5.46E-08	6.75E-05				
		Copper	7.00E+03								
		Total					6.7E-05				NA
101-09-038	**Adult Resident**	Arsenic	7.87E+01	4.44E-05	6.64E-06	8.45E-08	5.11E-05	2.87E-01	4.30E-02		3.31E-01
		Copper	1.43E+04					4.90E-01	1.95E-02		5.09E-01
		Total					5.1E-05				0.8
	Child Resident	Arsenic	7.87E+01	1.03E-04	1.09E-05	4.93E-08	1.14E-04	2.68E+00	2.82E-01		2.96E+00
		Copper	1.43E+04					4.57E+00	1.28E-01		4.70E+00
		Total					1.1E-04				7.7
	Adult/Child Resident	Arsenic	7.87E+01	1.48E-04	1.75E-05	1.34E-07	1.65E-04				
		Copper	1.43E+04								
		Total					1.7E-04				NA
101-09-039	**Adult Resident**	Arsenic	2.23E+01	1.26E-05	1.88E-06	2.40E-08	1.45E-05	8.15E-02	1.22E-02		9.36E-02
		Copper	6.89E+03					2.36E-01	9.41E-03		2.45E-01
		Total					1.4E-05				0.3
	Child Resident	Arsenic	2.23E+01	2.93E-05	3.08E-06	1.40E-08	3.24E-05	7.60E-01	7.98E-02		8.40E-01
		Copper	6.89E+03					2.20E+00	6.17E-02		2.26E+00
		Total					3.2E-05				3.1
	Adult/Child Resident	Arsenic	2.23E+01	4.19E-05	4.96E-06	3.79E-08	4.69E-05				
		Copper	6.89E+03								
		Total					4.7E-05				NA

Table A-199
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 14
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-042	**Adult Resident**	Arsenic	1.77E+01	9.98E-06	1.49E-06	1.90E-08	1.15E-05	6.47E-02	9.67E-03		7.43E-02
		Copper	4.96E+03					1.70E-01	6.78E-03		1.77E-01
		Total					1.1E-05				0.3
	Child Resident	Arsenic	1.77E+01	2.33E-05	2.44E-06	1.11E-08	2.57E-05	6.03E-01	6.34E-02		6.67E-01
		Copper	4.96E+03					1.59E+00	4.44E-02		1.63E+00
		Total					2.6E-05				2.3
	Adult/Child Resident	Arsenic	1.77E+01	3.33E-05	3.94E-06	3.01E-08	3.72E-05				
		Copper	4.96E+03								
		Total					3.7E-05				NA
101-09-045	**Adult Resident**	Arsenic	2.26E+01	1.27E-05	1.91E-06	2.43E-08	1.47E-05	8.26E-02	1.24E-02		9.49E-02
		Copper	5.01E+03					1.72E-01	6.85E-03		1.78E-01
		Total					1.5E-05				0.3
	Child Resident	Arsenic	2.26E+01	2.97E-05	3.12E-06	1.42E-08	3.29E-05	7.71E-01	8.09E-02		8.51E-01
		Copper	5.01E+03					1.60E+00	4.48E-02		1.65E+00
		Total					3.3E-05				2.5
	Adult/Child Resident	Arsenic	2.26E+01	4.25E-05	5.03E-06	3.84E-08	4.75E-05				
		Copper	5.01E+03								
		Total					4.8E-05				NA
101-09-047	**Adult Resident**	Arsenic	2.22E+01	1.25E-05	1.87E-06	2.38E-08	1.44E-05	8.11E-02	1.21E-02		9.32E-02
		Copper	7.33E+03					2.51E-01	1.00E-02		2.61E-01
		Total					1.4E-05				0.4
	Child Resident	Arsenic	2.22E+01	2.92E-05	3.07E-06	1.39E-08	3.23E-05	7.57E-01	7.95E-02		8.36E-01
		Copper	7.33E+03					2.34E+00	6.56E-02		2.41E+00
		Total					3.2E-05				3.2
	Adult/Child Resident	Arsenic	2.22E+01	4.17E-05	4.94E-06	3.78E-08	4.67E-05				
		Copper	7.33E+03								
		Total					4.7E-05				NA

Table A-199
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 14
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-054	**Adult Resident**	Arsenic	2.57E+01	1.45E-05	2.17E-06	2.76E-08	1.67E-05	9.39E-02	1.40E-02		1.08E-01
		Copper	7.48E+03					2.56E-01	1.02E-02		2.66E-01
		Total					1.7E-05				0.4
	Child Resident	Arsenic	2.57E+01	3.38E-05	3.55E-06	1.61E-08	3.74E-05	8.76E-01	9.20E-02		9.68E-01
		Copper	7.48E+03					2.39E+00	6.69E-02		2.46E+00
		Total					3.7E-05				3.4
	Adult/Child Resident	Arsenic	2.57E+01	4.83E-05	5.72E-06	4.37E-08	5.40E-05				
		Copper	7.48E+03								
		Total					5.4E-05				NA
101-09-077	**Adult Resident**	Arsenic	4.57E+01	2.58E-05	3.85E-06	4.91E-08	2.97E-05	1.67E-01	2.50E-02		1.92E-01
		Copper	6.55E+03					2.24E-01	8.95E-03		2.33E-01
		Total					3.0E-05				0.4
	Child Resident	Arsenic	4.57E+01	6.01E-05	6.31E-06	2.86E-08	6.64E-05	1.56E+00	1.64E-01		1.72E+00
		Copper	6.55E+03					2.09E+00	5.86E-02		2.15E+00
		Total					6.6E-05				3.9
	Adult/Child Resident	Arsenic	4.57E+01	8.59E-05	1.02E-05	7.77E-08	9.61E-05				
		Copper	6.55E+03								
		Total					9.6E-05				NA

Notes:
NA = Not applicable

Table A-200
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 14
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-09-036	6.7E-05	3.5
101-09-038	1.7E-04	7.7
101-09-039	4.7E-05	3.1
101-09-042	3.7E-05	2.3
101-09-045	4.8E-05	2.5
101-09-047	4.7E-05	3.2
101-09-054	5.4E-05	3.4
101-09-077	9.6E-05	3.9

Table A-201
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-083
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.36E+01	1.26E-05	1.50E+00	1.89E-05	1.89E-06	1.50E+00	2.83E-06	2.40E-09	1.51E+01	3.61E-08	2.18E-05
Copper	5.91E+03	2.78E-03	NA		1.11E-04	NA		4.22E-07	NA		
Child Resident											
Arsenic	3.36E+01	2.95E-05	1.50E+00	4.42E-05	3.09E-06	1.50E+00	4.64E-06	1.40E-09	1.51E+01	2.11E-08	4.88E-05
Copper	5.91E+03	6.48E-03	NA		1.81E-04	NA		2.46E-07	NA		
Total Adult Resident				1.9E-05			2.8E-06			3.6E-08	2.2E-05
Total Child Resident				4.4E-05			4.6E-06			2.1E-08	4.9E-05
Total Adult/Child Resident		(89.3% Contribution)		6.3E-05	(10.6% Contribution)		7.5E-06	(0.1% Contribution)		5.7E-08	7.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-202
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-083
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.36E+01	3.68E-05	3.00E-04	1.23E-01	5.51E-06	3.00E-04	1.84E-02	7.00E-09	NA		1.41E-01
Copper	5.91E+03	8.10E-03	4.00E-02	2.02E-01	3.23E-04	4.00E-02	8.08E-03	1.23E-06	NA		2.10E-01
Child Resident											
Arsenic	3.36E+01	3.44E-04	3.00E-04	1.15E+00	3.61E-05	3.00E-04	1.20E-01	1.63E-08	NA		1.27E+00
Copper	5.91E+03	7.56E-02	4.00E-02	1.89E+00	2.12E-03	4.00E-02	5.29E-02	2.87E-06	NA		1.94E+00
Total Adult Resident				3.3E-01			2.6E-02			0.0E+00	0.35
Total Child Resident		(94.6% Contribution)		3.0E+00	(5.4% Contribution)		1.7E-01	(0% Contribution)		0.0E+00	3.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-203
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-084
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.67E+01	1.38E-05	1.50E+00	2.07E-05	2.06E-06	1.50E+00	3.09E-06	2.62E-09	1.51E+01	3.94E-08	2.38E-05
Copper	7.90E+03	3.71E-03	NA		1.48E-04	NA		5.64E-07	NA		
Child Resident											
Arsenic	3.67E+01	3.22E-05	1.50E+00	4.83E-05	3.38E-06	1.50E+00	5.07E-06	1.53E-09	1.51E+01	2.30E-08	5.34E-05
Copper	7.90E+03	8.66E-03	NA		2.42E-04	NA		3.29E-07	NA		
Total Adult Resident				2.1E-05			3.1E-06			3.9E-08	2.4E-05
Total Child Resident				4.8E-05			5.1E-06			2.3E-08	5.3E-05
Total Adult/Child Resident		(89.3% Contribution)		6.9E-05	(10.6% Contribution)		8.2E-06	(0.1% Contribution)		6.2E-08	7.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-204
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-084
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.67E+01	4.02E-05	3.00E-04	1.34E-01	6.02E-06	3.00E-04	2.01E-02	7.64E-09	NA		1.54E-01
Copper	7.90E+03	1.08E-02	4.00E-02	2.71E-01	4.32E-04	4.00E-02	1.08E-02	1.64E-06	NA		2.81E-01
Child Resident											
Arsenic	3.67E+01	3.75E-04	3.00E-04	1.25E+00	3.94E-05	3.00E-04	1.31E-01	1.78E-08	NA		1.38E+00
Copper	7.90E+03	1.01E-01	4.00E-02	2.53E+00	2.83E-03	4.00E-02	7.07E-02	3.84E-06	NA		2.60E+00
Total Adult Resident				4.0E-01			3.1E-02			0.0E+00	0.44
Total Child Resident		(94.9% Contribution)		3.8E+00	(5.1% Contribution)		2.0E-01	(0% Contribution)		0.0E+00	4.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-205
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-088
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.91E+01	7.18E-06	1.50E+00	1.08E-05	1.07E-06	1.50E+00	1.61E-06	1.36E-09	1.51E+01	2.05E-08	1.24E-05
Copper	2.69E+03	1.26E-03	NA		5.04E-05	NA		1.92E-07	NA		
Child Resident											
Arsenic	1.91E+01	1.67E-05	1.50E+00	2.51E-05	1.76E-06	1.50E+00	2.64E-06	7.95E-10	1.51E+01	1.20E-08	2.78E-05
Copper	2.69E+03	2.95E-03	NA		8.25E-05	NA		1.12E-07	NA		
Total Adult Resident				1.1E-05			1.6E-06			2.1E-08	1.2E-05
Total Child Resident				2.5E-05			2.6E-06			1.2E-08	2.8E-05
Total Adult/Child Resident		(89.3% Contribution)		3.6E-05	(10.6% Contribution)		4.2E-06	(0.1% Contribution)		3.2E-08	4.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-206
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-088
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.91E+01	2.09E-05	3.00E-04	6.98E-02	3.13E-06	3.00E-04	1.04E-02	3.98E-09	NA		8.0E-02
Copper	2.69E+03	3.68E-03	4.00E-02	9.21E-02	1.47E-04	4.00E-02	3.68E-03	5.60E-07	NA		9.6E-02
Child Resident											
Arsenic	1.91E+01	1.95E-04	3.00E-04	6.51E-01	2.05E-05	3.00E-04	6.84E-02	9.28E-09	NA		7.2E-01
Copper	2.69E+03	3.44E-02	4.00E-02	8.60E-01	9.63E-04	4.00E-02	2.41E-02	1.31E-06	NA		8.8E-01
Total Adult Resident				1.6E-01			1.4E-02			0.0E+00	0.18
Total Child Resident		(94.2% Contribution)		1.5E+00	(5.8% Contribution)		9.2E-02	(0% Contribution)		0.0E+00	1.6

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-207
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-134
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.91E+01	7.18E-06	1.50E+00	1.08E-05	1.07E-06	1.50E+00	1.61E-06	1.36E-09	1.51E+01	2.05E-08	1.24E-05
Copper	6.01E+03	2.82E-03	NA		1.13E-04	NA		4.29E-07	NA		
Child Resident											
Arsenic	1.91E+01	1.67E-05	1.50E+00	2.51E-05	1.76E-06	1.50E+00	2.64E-06	7.95E-10	1.51E+01	1.20E-08	2.78E-05
Copper	6.01E+03	6.59E-03	NA		1.84E-04	NA		2.50E-07	NA		
Total Adult Resident				1.1E-05			1.6E-06			2.1E-08	1.2E-05
Total Child Resident				2.5E-05			2.6E-06			1.2E-08	2.8E-05
Total Adult/Child Resident		(89.3% Contribution)		3.6E-05	(10.6% Contribution)		4.2E-06	(0.1% Contribution)		3.2E-08	4.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-208
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 15 - Property 101-09-134
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 15, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.91E+01	2.09E-05	3.00E-04	6.98E-02	3.13E-06	3.00E-04	1.04E-02	3.98E-09	NA		8.0E-02
Copper	6.01E+03	8.23E-03	4.00E-02	2.06E-01	3.28E-04	4.00E-02	8.21E-03	1.25E-06	NA		2.1E-01
Child Resident											
Arsenic	1.91E+01	1.95E-04	3.00E-04	6.51E-01	2.05E-05	3.00E-04	6.84E-02	9.28E-09	NA		7.2E-01
Copper	6.01E+03	7.68E-02	4.00E-02	1.92E+00	2.15E-03	4.00E-02	5.38E-02	2.92E-06	NA		2.0E+00
Total Adult Resident				2.8E-01			1.9E-02			0.0E+00	0.29
Total Child Resident		(95.5% Contribution)		2.6E+00	(4.5% Contribution)		1.2E-01	(0% Contribution)		0.0E+00	2.7

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-209
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 15
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-083	**Adult Resident**	Arsenic	3.36E+01	1.89E-05	2.83E-06	3.61E-08	2.18E-05	1.23E-01	1.84E-02		1.41E-01
		Copper	5.91E+03					2.02E-01	8.08E-03		2.10E-01
		Total					2.2E-05				0.4
	Child Resident	Arsenic	3.36E+01	4.42E-05	4.64E-06	2.11E-08	4.88E-05	1.15E+00	1.20E-01		1.27E+00
		Copper	5.91E+03					1.89E+00	5.29E-02		1.94E+00
		Total					4.9E-05				3.2
	Adult/Child Resident	Arsenic	3.36E+01	6.31E-05	7.47E-06	5.71E-08	7.07E-05				
		Copper	5.91E+03								
		Total					7.1E-05				NA
101-09-084	**Adult Resident**	Arsenic	3.67E+01	2.07E-05	3.09E-06	3.94E-08	2.38E-05	1.34E-01	2.01E-02		1.54E-01
		Copper	7.90E+03					2.71E-01	1.08E-02		2.81E-01
		Total					2.4E-05				0.4
	Child Resident	Arsenic	3.67E+01	4.83E-05	5.07E-06	2.30E-08	5.34E-05	1.25E+00	1.31E-01		1.38E+00
		Copper	7.90E+03					2.53E+00	7.07E-02		2.60E+00
		Total					5.3E-05				4.0
	Adult/Child Resident	Arsenic	3.67E+01	6.89E-05	8.16E-06	6.24E-08	7.72E-05				
		Copper	7.90E+03								
		Total					7.7E-05				NA
101-09-088	**Adult Resident**	Arsenic	1.91E+01	1.08E-05	1.61E-06	2.05E-08	1.24E-05	6.98E-02	1.04E-02		8.02E-02
		Copper	2.69E+03					9.21E-02	3.68E-03		9.58E-02
		Total					1.2E-05				0.2
	Child Resident	Arsenic	1.91E+01	2.51E-05	2.64E-06	1.20E-08	2.78E-05	6.51E-01	6.84E-02		7.20E-01
		Copper	2.69E+03					8.60E-01	2.41E-02		8.84E-01
		Total					2.8E-05				1.6
	Adult/Child Resident	Arsenic	1.91E+01	3.59E-05	4.25E-06	3.25E-08	4.02E-05				
		Copper	2.69E+03								
		Total					4.0E-05				NA

Table A-209
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 15
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-134	**Adult Resident**	Arsenic	1.91E+01	1.08E-05	1.61E-06	2.05E-08	1.24E-05	6.98E-02	1.04E-02		8.02E-02
		Copper	6.01E+03					2.06E-01	8.21E-03		2.14E-01
		Total					1.2E-05				0.3
	Child Resident	Arsenic	1.91E+01	2.51E-05	2.64E-06	1.20E-08	2.78E-05	6.51E-01	6.84E-02		7.20E-01
		Copper	6.01E+03					1.92E+00	5.38E-02		1.97E+00
		Total					2.8E-05				2.7
	Adult/Child Resident	Arsenic	1.91E+01	3.59E-05	4.25E-06	3.25E-08	4.02E-05				
		Copper	6.01E+03								
		Total					4.0E-05				NA

Notes:
NA = Not applicable

Table A-210
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 15
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-09-083	7.1E-05	3.2
101-09-084	7.7E-05	4.0
101-09-088	4.0E-05	1.6
101-09-134	4.0E-05	2.7

Table A-211
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-104
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.29E+01	1.61E-05	1.50E+00	2.42E-05	2.41E-06	1.50E+00	3.62E-06	3.06E-09	1.51E+01	4.61E-08	2.78E-05
Copper	1.27E+04	5.96E-03	NA		2.38E-04	NA		9.07E-07	NA		
Child Resident											
Arsenic	4.29E+01	3.76E-05	1.50E+00	5.64E-05	3.95E-06	1.50E+00	5.92E-06	1.79E-09	1.51E+01	2.69E-08	6.24E-05
Copper	1.27E+04	1.39E-02	NA		3.90E-04	NA		5.29E-07	NA		
Total Adult Resident				2.4E-05			3.6E-06			4.6E-08	2.8E-05
Total Child Resident				5.6E-05			5.9E-06			2.7E-08	6.2E-05
Total Adult/Child Resident		(89.3% Contribution)		8.1E-05	(10.6% Contribution)		9.5E-06	(0.1% Contribution)		7.3E-08	9.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-212
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-104
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.29E+01	4.70E-05	3.00E-04	1.57E-01	7.03E-06	3.00E-04	2.34E-02	8.93E-09	NA		1.80E-01
Copper	1.27E+04	1.74E-02	4.00E-02	4.35E-01	6.94E-04	4.00E-02	1.74E-02	2.64E-06	NA		4.52E-01
Child Resident											
Arsenic	4.29E+01	4.39E-04	3.00E-04	1.46E+00	4.61E-05	3.00E-04	1.54E-01	2.08E-08	NA		1.62E+00
Copper	1.27E+04	1.62E-01	4.00E-02	4.06E+00	4.55E-03	4.00E-02	1.14E-01	6.17E-06	NA		4.17E+00
Total Adult Resident				5.9E-01			4.1E-02			0.0E+00	0.63
Total Child Resident		(95.4% Contribution)		5.5E+00	(4.6% Contribution)		2.7E-01	(0% Contribution)		0.0E+00	5.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-213
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-106
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.24E+01	1.97E-05	1.50E+00	2.95E-05	2.95E-06	1.50E+00	4.42E-06	3.74E-09	1.51E+01	5.63E-08	3.40E-05
Copper	1.20E+04	5.64E-03	NA		2.25E-04	NA		8.57E-07	NA		
Child Resident											
Arsenic	5.24E+01	4.59E-05	1.50E+00	6.89E-05	4.82E-06	1.50E+00	7.24E-06	2.18E-09	1.51E+01	3.28E-08	7.62E-05
Copper	1.20E+04	1.32E-02	NA		3.68E-04	NA		5.00E-07	NA		
Total Adult Resident				3.0E-05			4.4E-06			5.6E-08	3.4E-05
Total Child Resident				6.9E-05			7.2E-06			3.3E-08	7.6E-05
Total Adult/Child Resident		(89.3% Contribution)		9.8E-05	(10.6% Contribution)		1.2E-05	(0.1% Contribution)		8.9E-08	1.1E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-214
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-106
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.24E+01	5.74E-05	3.00E-04	1.91E-01	8.59E-06	3.00E-04	2.86E-02	1.09E-08	NA		2.2E-01
Copper	1.20E+04	1.64E-02	4.00E-02	4.11E-01	6.56E-04	4.00E-02	1.64E-02	2.50E-06	NA		4.3E-01
Child Resident											
Arsenic	5.24E+01	5.36E-04	3.00E-04	1.79E+00	5.63E-05	3.00E-04	1.88E-01	2.55E-08	NA		2.0E+00
Copper	1.20E+04	1.53E-01	4.00E-02	3.84E+00	4.30E-03	4.00E-02	1.07E-01	5.83E-06	NA		3.9E+00
Total Adult Resident				6.0E-01			4.5E-02			0.0E+00	0.65
Total Child Resident			(95% Contribution)	5.6E+00		(5% Contribution)	2.9E-01		(0% Contribution)	0.0E+00	5.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-215
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-107
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.55E+01	1.33E-05	1.50E+00	2.00E-05	2.00E-06	1.50E+00	2.99E-06	2.53E-09	1.51E+01	3.81E-08	2.30E-05
Copper	8.70E+03	4.09E-03	NA		1.63E-04	NA		6.21E-07	NA		
Child Resident											
Arsenic	3.55E+01	3.11E-05	1.50E+00	4.67E-05	3.27E-06	1.50E+00	4.90E-06	1.48E-09	1.51E+01	2.22E-08	5.16E-05
Copper	8.70E+03	9.53E-03	NA		2.67E-04	NA		3.62E-07	NA		
Total Adult Resident				2.0E-05			3.0E-06			3.8E-08	2.3E-05
Total Child Resident				4.7E-05			4.9E-06			2.2E-08	5.2E-05
Total Adult/Child Resident		(89.3% Contribution)		6.7E-05	(10.6% Contribution)		7.9E-06	(0.1% Contribution)		6.0E-08	7.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-216
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-107
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.55E+01	3.89E-05	3.00E-04	1.30E-01	5.82E-06	3.00E-04	1.94E-02	7.39E-09	NA		1.5E-01
Copper	8.70E+03	1.19E-02	4.00E-02	2.98E-01	4.76E-04	4.00E-02	1.19E-02	1.81E-06	NA		3.1E-01
Child Resident											
Arsenic	3.55E+01	3.63E-04	3.00E-04	1.21E+00	3.81E-05	3.00E-04	1.27E-01	1.72E-08	NA		1.3E+00
Copper	8.70E+03	1.11E-01	4.00E-02	2.78E+00	3.11E-03	4.00E-02	7.79E-02	4.23E-06	NA		2.9E+00
Total Adult Resident				4.3E-01			3.1E-02			0.0E+00	0.46
Total Child Resident		(95.1% Contribution)		4.0E+00	(4.9% Contribution)		2.0E-01	(0% Contribution)		0.0E+00	4.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-217
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-108
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.23E+01	1.97E-05	1.50E+00	2.95E-05	2.94E-06	1.50E+00	4.41E-06	3.73E-09	1.51E+01	5.62E-08	3.39E-05
Copper	1.58E+04	7.42E-03	NA		2.96E-04	NA		1.13E-06	NA		
Child Resident											
Arsenic	5.23E+01	4.59E-05	1.50E+00	6.88E-05	4.81E-06	1.50E+00	7.22E-06	2.18E-09	1.51E+01	3.28E-08	7.60E-05
Copper	1.58E+04	1.73E-02	NA		4.85E-04	NA		6.58E-07	NA		
Total Adult Resident				2.9E-05			4.4E-06			5.6E-08	3.4E-05
Total Child Resident				6.9E-05			7.2E-06			3.3E-08	7.6E-05
Total Adult/Child Resident		(89.3% Contribution)		9.8E-05	(10.6% Contribution)		1.2E-05	(0.1% Contribution)		8.9E-08	1.1E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-218
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-108
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.23E+01	5.73E-05	3.00E-04	1.91E-01	8.58E-06	3.00E-04	2.86E-02	1.09E-08	NA		2.2E-01
Copper	1.58E+04	2.16E-02	4.00E-02	5.41E-01	8.64E-04	4.00E-02	2.16E-02	3.29E-06	NA		5.6E-01
Child Resident											
Arsenic	5.23E+01	5.35E-04	3.00E-04	1.78E+00	5.62E-05	3.00E-04	1.87E-01	2.54E-08	NA		2.0E+00
Copper	1.58E+04	2.02E-01	4.00E-02	5.05E+00	5.66E-03	4.00E-02	1.41E-01	7.68E-06	NA		5.2E+00
Total Adult Resident				7.3E-01			5.0E-02			0.0E+00	0.78
Total Child Resident		(95.4% Contribution)		6.8E+00	(4.6% Contribution)		3.3E-01	(0% Contribution)		0.0E+00	7.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-219
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-109
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.82E+01	1.44E-05	1.50E+00	2.15E-05	2.15E-06	1.50E+00	3.22E-06	2.73E-09	1.51E+01	4.10E-08	2.48E-05
Copper	1.44E+04	6.76E-03	NA		2.70E-04	NA		1.03E-06	NA		
Child Resident											
Arsenic	3.82E+01	3.35E-05	1.50E+00	5.02E-05	3.52E-06	1.50E+00	5.27E-06	1.59E-09	1.51E+01	2.39E-08	5.55E-05
Copper	1.44E+04	1.58E-02	NA		4.42E-04	NA		6.00E-07	NA		
Total Adult Resident				2.2E-05			3.2E-06			4.1E-08	2.5E-05
Total Child Resident				5.0E-05			5.3E-06			2.4E-08	5.6E-05
Total Adult/Child Resident		(89.3% Contribution)		7.2E-05	(10.6% Contribution)		8.5E-06	(0.1% Contribution)		6.5E-08	8.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-220
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-109
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.82E+01	4.19E-05	3.00E-04	1.40E-01	6.26E-06	3.00E-04	2.09E-02	7.95E-09	NA		1.6E-01
Copper	1.44E+04	1.97E-02	4.00E-02	4.93E-01	7.87E-04	4.00E-02	1.97E-02	3.00E-06	NA		5.1E-01
Child Resident											
Arsenic	3.82E+01	3.91E-04	3.00E-04	1.30E+00	4.10E-05	3.00E-04	1.37E-01	1.86E-08	NA		1.4E+00
Copper	1.44E+04	1.84E-01	4.00E-02	4.60E+00	5.16E-03	4.00E-02	1.29E-01	7.00E-06	NA		4.7E+00
Total Adult Resident				6.3E-01			4.1E-02			0.0E+00	0.67
Total Child Resident		(95.7% Contribution)		5.9E+00	(4.3% Contribution)		2.7E-01	(0% Contribution)		0.0E+00	6.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-221
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-111B
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.05E+01	2.27E-05	1.50E+00	3.41E-05	3.40E-06	1.50E+00	5.10E-06	4.32E-09	1.51E+01	6.50E-08	3.93E-05
Copper	1.38E+04	6.48E-03	NA		2.59E-04	NA		9.85E-07	NA		
Child Resident											
Arsenic	6.05E+01	5.30E-05	1.50E+00	7.96E-05	5.57E-06	1.50E+00	8.35E-06	2.52E-09	1.51E+01	3.79E-08	8.80E-05
Copper	1.38E+04	1.51E-02	NA		4.23E-04	NA		5.75E-07	NA		
Total Adult Resident				3.4E-05			5.1E-06			6.5E-08	3.9E-05
Total Child Resident				8.0E-05			8.4E-06			3.8E-08	8.8E-05
Total Adult/Child Resident		(89.3% Contribution)		1.1E-04	(10.6% Contribution)		1.3E-05	(0.1% Contribution)		1.0E-07	1.3E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-222
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-111B
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.05E+01	6.63E-05	3.00E-04	2.21E-01	9.92E-06	3.00E-04	3.31E-02	1.26E-08	NA		2.5E-01
Copper	1.38E+04	1.89E-02	4.00E-02	4.73E-01	7.54E-04	4.00E-02	1.89E-02	2.87E-06	NA		4.9E-01
Child Resident											
Arsenic	6.05E+01	6.19E-04	3.00E-04	2.06E+00	6.50E-05	3.00E-04	2.17E-01	2.94E-08	NA		2.3E+00
Copper	1.38E+04	1.76E-01	4.00E-02	4.41E+00	4.94E-03	4.00E-02	1.24E-01	6.70E-06	NA		4.5E+00
Total Adult Resident				6.9E-01			5.2E-02			0.0E+00	0.75
Total Child Resident			(95% Contribution)	6.5E+00		(5% Contribution)	3.4E-01		(0% Contribution)	0.0E+00	6.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-223
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-137
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.08E+01	1.16E-05	1.50E+00	1.74E-05	1.73E-06	1.50E+00	2.60E-06	2.20E-09	1.51E+01	3.31E-08	2.00E-05
Copper	5.57E+03	2.62E-03	NA		1.04E-04	NA		3.98E-07	NA		
Child Resident											
Arsenic	3.08E+01	2.70E-05	1.50E+00	4.05E-05	2.84E-06	1.50E+00	4.25E-06	1.28E-09	1.51E+01	1.93E-08	4.48E-05
Copper	5.57E+03	6.10E-03	NA		1.71E-04	NA		2.32E-07	NA		
Total Adult Resident				1.7E-05			2.6E-06			3.3E-08	2.0E-05
Total Child Resident				4.1E-05			4.3E-06			1.9E-08	4.5E-05
Total Adult/Child Resident		(89.3% Contribution)		5.8E-05	(10.6% Contribution)		6.9E-06	(0.1% Contribution)		5.2E-08	6.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-224
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-137
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.08E+01	3.38E-05	3.00E-04	1.13E-01	5.05E-06	3.00E-04	1.68E-02	6.41E-09	NA		1.3E-01
Copper	5.57E+03	7.63E-03	4.00E-02	1.91E-01	3.04E-04	4.00E-02	7.61E-03	1.16E-06	NA		2.0E-01
Child Resident											
Arsenic	3.08E+01	3.15E-04	3.00E-04	1.05E+00	3.31E-05	3.00E-04	1.10E-01	1.50E-08	NA		1.2E+00
Copper	5.57E+03	7.12E-02	4.00E-02	1.78E+00	1.99E-03	4.00E-02	4.99E-02	2.71E-06	NA		1.8E+00
Total Adult Resident				3.0E-01			2.4E-02			0.0E+00	0.33
Total Child Resident		(94.6% Contribution)		2.8E+00	(5.4% Contribution)		1.6E-01	(0% Contribution)		0.0E+00	3.0

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-225
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-140
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.21E+02	8.30E-05	1.50E+00	1.25E-04	1.24E-05	1.50E+00	1.86E-05	1.58E-08	1.51E+01	2.37E-07	1.43E-04
Copper	3.97E+04	1.86E-02	NA		7.44E-04	NA		2.83E-06	NA		
Child Resident											
Arsenic	2.21E+02	1.94E-04	1.50E+00	2.91E-04	2.03E-05	1.50E+00	3.05E-05	9.20E-09	1.51E+01	1.38E-07	3.21E-04
Copper	3.97E+04	4.35E-02	NA		1.22E-03	NA		1.65E-06	NA		
Total Adult Resident				1.2E-04			1.9E-05			2.4E-07	1.4E-04
Total Child Resident				2.9E-04			3.1E-05			1.4E-07	3.2E-04
Total Adult/Child Resident		(89.3% Contribution)		4.2E-04	(10.6% Contribution)		4.9E-05	(0.1% Contribution)		3.8E-07	4.6E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-226
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 16 - Property 101-09-140
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 16, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.21E+02	2.42E-04	3.00E-04	8.07E-01	3.62E-05	3.00E-04	1.21E-01	4.60E-08	NA		9.3E-01
Copper	3.97E+04	5.44E-02	4.00E-02	1.36E+00	2.17E-03	4.00E-02	5.42E-02	8.26E-06	NA		1.4E+00
Child Resident											
Arsenic	2.21E+02	2.26E-03	3.00E-04	7.53E+00	2.37E-04	3.00E-04	7.91E-01	1.07E-07	NA		8.3E+00
Copper	3.97E+04	5.08E-01	4.00E-02	1.27E+01	1.42E-02	4.00E-02	3.55E-01	1.93E-05	NA		1.3E+01
Total Adult Resident				2.2E+00			1.8E-01			0.0E+00	2.34
Total Child Resident		(94.6% Contribution)		2.0E+01	(5.4% Contribution)		1.1E+00	(0% Contribution)		0.0E+00	21.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-227
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 16
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-104	**Adult Resident**	Arsenic	4.29E+01	2.42E-05	3.62E-06	4.61E-08	2.78E-05	1.57E-01	2.34E-02		1.80E-01
		Copper	1.27E+04					4.35E-01	1.74E-02		4.52E-01
		Total					2.8E-05				0.6
	Child Resident	Arsenic	4.29E+01	5.64E-05	5.92E-06	2.69E-08	6.24E-05	1.46E+00	1.54E-01		1.62E+00
		Copper	1.27E+04					4.06E+00	1.14E-01		4.17E+00
		Total					6.2E-05				5.8
	Adult/Child Resident	Arsenic	4.29E+01	8.06E-05	9.54E-06	7.30E-08	9.02E-05				
		Copper	1.27E+04								
		Total					9.0E-05				NA
101-09-106	**Adult Resident**	Arsenic	5.24E+01	2.95E-05	4.42E-06	5.63E-08	3.40E-05	1.91E-01	2.86E-02		2.20E-01
		Copper	1.20E+04					4.11E-01	1.64E-02		4.27E-01
		Total					3.4E-05				0.6
	Child Resident	Arsenic	5.24E+01	6.89E-05	7.24E-06	3.28E-08	7.62E-05	1.79E+00	1.88E-01		1.97E+00
		Copper	1.20E+04					3.84E+00	1.07E-01		3.94E+00
		Total					7.6E-05				5.9
	Adult/Child Resident	Arsenic	5.24E+01	9.84E-05	1.17E-05	8.91E-08	1.10E-04				
		Copper	1.20E+04								
		Total					1.1E-04				NA
101-09-107	**Adult Resident**	Arsenic	3.55E+01	2.00E-05	2.99E-06	3.81E-08	2.30E-05	1.30E-01	1.94E-02		1.49E-01
		Copper	8.70E+03					2.98E-01	1.19E-02		3.10E-01
		Total					2.3E-05				0.5
	Child Resident	Arsenic	3.55E+01	4.67E-05	4.90E-06	2.22E-08	5.16E-05	1.21E+00	1.27E-01		1.34E+00
		Copper	8.70E+03					2.78E+00	7.79E-02		2.86E+00
		Total					5.2E-05				4.2
	Adult/Child Resident	Arsenic	3.55E+01	6.67E-05	7.90E-06	6.04E-08	7.46E-05				
		Copper	8.70E+03								
		Total					7.5E-05				NA

Table A-227
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 16
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-108	**Adult Resident**	Arsenic	5.23E+01	2.95E-05	4.41E-06	5.62E-08	3.39E-05	1.91E-01	2.86E-02		2.20E-01
		Copper	1.58E+04					5.41E-01	2.16E-02		5.63E-01
		Total					3.4E-05				0.8
	Child Resident	Arsenic	5.23E+01	6.88E-05	7.22E-06	3.28E-08	7.60E-05	1.78E+00	1.87E-01		1.97E+00
		Copper	1.58E+04					5.05E+00	1.41E-01		5.19E+00
		Total					7.6E-05				7.2
	Adult/Child Resident	Arsenic	5.23E+01	9.83E-05	1.16E-05	8.90E-08	1.10E-04				
		Copper	1.58E+04								
		Total					1.1E-04				NA
101-09-109	**Adult Resident**	Arsenic	3.82E+01	2.15E-05	3.22E-06	4.10E-08	2.48E-05	1.40E-01	2.09E-02		1.60E-01
		Copper	1.44E+04					4.93E-01	1.97E-02		5.13E-01
		Total					2.5E-05				0.7
	Child Resident	Arsenic	3.82E+01	5.02E-05	5.27E-06	2.39E-08	5.55E-05	1.30E+00	1.37E-01		1.44E+00
		Copper	1.44E+04					4.60E+00	1.29E-01		4.73E+00
		Total					5.6E-05				6.2
	Adult/Child Resident	Arsenic	3.82E+01	7.18E-05	8.50E-06	6.50E-08	8.03E-05				
		Copper	1.44E+04								
		Total					8.0E-05				NA
101-09-111B	**Adult Resident**	Arsenic	6.05E+01	3.41E-05	5.10E-06	6.50E-08	3.93E-05	2.21E-01	3.31E-02		2.54E-01
		Copper	1.38E+04					4.73E-01	1.89E-02		4.91E-01
		Total					3.9E-05				0.7
	Child Resident	Arsenic	6.05E+01	7.96E-05	8.35E-06	3.79E-08	8.80E-05	2.06E+00	2.17E-01		2.28E+00
		Copper	1.38E+04					4.41E+00	1.24E-01		4.53E+00
		Total					8.8E-05				6.8
	Adult/Child Resident	Arsenic	6.05E+01	1.14E-04	1.35E-05	1.03E-07	1.27E-04				
		Copper	1.38E+04								
		Total					1.3E-04				NA

Table A-227
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 16
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-137	**Adult Resident**	Arsenic	3.08E+01	1.74E-05	2.60E-06	3.31E-08	2.00E-05	1.13E-01	1.68E-02		1.29E-01
		Copper	5.57E+03					1.91E-01	7.61E-03		1.98E-01
		Total					2.0E-05				0.3
	Child Resident	Arsenic	3.08E+01	4.05E-05	4.25E-06	1.93E-08	4.48E-05	1.05E+00	1.10E-01		1.16E+00
		Copper	5.57E+03					1.78E+00	4.99E-02		1.83E+00
		Total					4.5E-05				3.0
	Adult/Child Resident	Arsenic	3.08E+01	5.79E-05	6.85E-06	5.24E-08	6.48E-05				
		Copper	5.57E+03								
		Total					6.5E-05				NA
101-09-140	**Adult Resident**	Arsenic	2.21E+02	1.25E-04	1.86E-05	2.37E-07	1.43E-04	8.07E-01	1.21E-01		9.28E-01
		Copper	3.97E+04					1.36E+00	5.42E-02		1.41E+00
		Total					1.4E-04				2.3
	Child Resident	Arsenic	2.21E+02	2.91E-04	3.05E-05	1.38E-07	3.21E-04	7.53E+00	7.91E-01		8.33E+00
		Copper	3.97E+04					1.27E+01	3.55E-01		1.30E+01
		Total					3.2E-04				21.4
	Adult/Child Resident	Arsenic	2.21E+02	4.15E-04	4.92E-05	3.76E-07	4.65E-04				
		Copper	3.97E+04								
		Total					4.6E-04				NA

Notes:
NA = Not applicable

Table A-228
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 16
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-09-104	9.0E-05	5.8
101-09-106	1.1E-04	5.9
101-09-107	7.5E-05	4.2
101-09-108	1.1E-04	7.2
101-09-109	8.0E-05	6.2
101-09-111B	1.3E-04	6.8
101-09-137	6.5E-05	3.0
101-09-140	4.6E-04	21

Table A-229
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-115
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 17, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.36E+01	1.26E-05	1.50E+00	1.89E-05	1.89E-06	1.50E+00	2.83E-06	2.40E-09	1.51E+01	3.61E-08	2.18E-05
Copper	7.43E+03	3.49E-03	NA		1.39E-04	NA		5.30E-07	NA		
Child Resident											
Arsenic	3.36E+01	2.95E-05	1.50E+00	4.42E-05	3.09E-06	1.50E+00	4.64E-06	1.40E-09	1.51E+01	2.11E-08	4.88E-05
Copper	7.43E+03	8.14E-03	NA		2.28E-04	NA		3.09E-07	NA		
Total Adult Resident				1.9E-05			2.8E-06			3.6E-08	2.2E-05
Total Child Resident				4.4E-05			4.6E-06			2.1E-08	4.9E-05
Total Adult/Child Resident		(89.3% Contribution)		6.3E-05	(10.6% Contribution)		7.5E-06	(0.1% Contribution)		5.7E-08	7.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-230
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-115
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 17, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	3.36E+01	3.68E-05	3.00E-04	1.23E-01	5.51E-06	3.00E-04	1.84E-02	7.00E-09	NA		1.41E-01
Copper	7.43E+03	1.02E-02	4.00E-02	2.54E-01	4.06E-04	4.00E-02	1.02E-02	1.55E-06	NA		2.65E-01
Child Resident											
Arsenic	3.36E+01	3.44E-04	3.00E-04	1.15E+00	3.61E-05	3.00E-04	1.20E-01	1.63E-08	NA		1.27E+00
Copper	7.43E+03	9.50E-02	4.00E-02	2.37E+00	2.66E-03	4.00E-02	6.65E-02	3.61E-06	NA		2.44E+00
Total Adult Resident				3.8E-01			2.9E-02			0.0E+00	0.41
Total Child Resident			(95% Contribution)	3.5E+00		(5% Contribution)	1.9E-01		(0% Contribution)	0.0E+00	3.7

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-231
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-120
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 17, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF $[mg/kg/day]^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.06E+01	1.53E-05	1.50E+00	2.29E-05	2.28E-06	1.50E+00	3.42E-06	2.90E-09	1.51E+01	4.36E-08	2.63E-05
Copper	7.98E+03	3.75E-03	NA		1.50E-04	NA		5.70E-07	NA		
Child Resident											
Arsenic	4.06E+01	3.56E-05	1.50E+00	5.34E-05	3.74E-06	1.50E+00	5.61E-06	1.69E-09	1.51E+01	2.54E-08	5.90E-05
Copper	7.98E+03	8.75E-03	NA		2.45E-04	NA		3.32E-07	NA		
Total Adult Resident				2.3E-05			3.4E-06			4.4E-08	2.6E-05
Total Child Resident				5.3E-05			5.6E-06			2.5E-08	5.9E-05
Total Adult/Child Resident		(89.3% Contribution)		7.6E-05	(10.6% Contribution)		9.0E-06	(0.1% Contribution)		6.9E-08	8.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-232
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 17 - Property 101-09-120
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 17, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m^3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m^3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm^2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm^2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.06E+01	4.45E-05	3.00E-04	1.48E-01	6.66E-06	3.00E-04	2.22E-02	8.45E-09	NA		1.7E-01
Copper	7.98E+03	1.09E-02	4.00E-02	2.73E-01	4.36E-04	4.00E-02	1.09E-02	1.66E-06	NA		2.8E-01
Child Resident											
Arsenic	4.06E+01	4.15E-04	3.00E-04	1.38E+00	4.36E-05	3.00E-04	1.45E-01	1.97E-08	NA		1.5E+00
Copper	7.98E+03	1.02E-01	4.00E-02	2.55E+00	2.86E-03	4.00E-02	7.14E-02	3.88E-06	NA		2.6E+00
Total Adult Resident				4.2E-01			3.3E-02			0.0E+00	0.45
Total Child Resident		(94.8% Contribution)		3.9E+00	(5.2% Contribution)		2.2E-01	(0% Contribution)		0.0E+00	4.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-233
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-09-115	**Adult Resident**	Arsenic	3.36E+01	1.89E-05	2.83E-06	3.61E-08	2.18E-05	1.23E-01	1.84E-02		1.41E-01
		Copper	7.43E+03					2.54E-01	1.02E-02		2.65E-01
		Total					2.2E-05				0.4
	Child Resident	Arsenic	3.36E+01	4.42E-05	4.64E-06	2.11E-08	4.88E-05	1.15E+00	1.20E-01		1.27E+00
		Copper	7.43E+03					2.37E+00	6.65E-02		2.44E+00
		Total					4.9E-05				3.7
	Adult/Child Resident	Arsenic	3.36E+01	6.31E-05	7.47E-06	5.71E-08	7.07E-05				
		Copper	7.43E+03								
		Total					7.1E-05				NA
101-09-120	**Adult Resident**	Arsenic	4.06E+01	2.29E-05	3.42E-06	4.36E-08	2.63E-05	1.48E-01	2.22E-02		1.71E-01
		Copper	7.98E+03					2.73E-01	1.09E-02		2.84E-01
		Total					2.6E-05				0.5
	Child Resident	Arsenic	4.06E+01	5.34E-05	5.61E-06	2.54E-08	5.90E-05	1.38E+00	1.45E-01		1.53E+00
		Copper	7.98E+03					2.55E+00	7.14E-02		2.62E+00
		Total					5.9E-05				4.2
	Adult/Child Resident	Arsenic	4.06E+01	7.63E-05	9.03E-06	6.91E-08	8.54E-05				
		Copper	7.98E+03								
		Total					8.5E-05				NA

Notes:
NA = Not applicable

Table A-234
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 17
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-09-115	7.1E-05	3.7
101-09-120	8.5E-05	4.2

Risk Calculations

Winkelman Residential Properties

Table A-235
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008F
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.48E+00	2.06E-06	1.50E+00	3.09E-06	3.08E-07	1.50E+00	4.62E-07	3.91E-10	1.51E+01	5.89E-09	3.56E-06
Copper	6.55E+02	3.08E-04	NA		1.23E-05	NA		4.68E-08	NA		
Child Resident											
Arsenic	5.48E+00	4.80E-06	1.50E+00	7.21E-06	5.04E-07	1.50E+00	7.57E-07	2.28E-10	1.51E+01	3.43E-09	7.97E-06
Copper	6.55E+02	7.18E-04	NA		2.01E-05	NA		2.73E-08	NA		
Total Adult Resident				3.1E-06			4.6E-07			5.9E-09	3.6E-06
Total Child Resident				7.2E-06			7.6E-07			3.4E-09	8.0E-06
Total Adult/Child Resident		(89.3% Contribution)		1.0E-05	(10.6% Contribution)		1.2E-06	(0.1% Contribution)		9.3E-09	1.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-236
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008F
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.48E+00	6.01E-06	3.00E-04	2.00E-02	8.99E-07	3.00E-04	3.00E-03	1.14E-09	NA		2.30E-02
Copper	6.55E+02	8.97E-04	4.00E-02	2.24E-02	3.58E-05	4.00E-02	8.95E-04	1.36E-07	NA		2.33E-02
Child Resident											
Arsenic	5.48E+00	5.61E-05	3.00E-04	1.87E-01	5.89E-06	3.00E-04	1.96E-02	2.66E-09	NA		2.06E-01
Copper	6.55E+02	8.37E-03	4.00E-02	2.09E-01	2.34E-04	4.00E-02	5.86E-03	3.18E-07	NA		2.15E-01
Total Adult Resident				4.2E-02			3.9E-03			0.0E+00	0.05
Total Child Resident			(94% Contribution)	4.0E-01		(6% Contribution)	2.5E-02		(0% Contribution)	0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-237
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008J
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.01E+01	7.55E-06	1.50E+00	1.13E-05	1.13E-06	1.50E+00	1.70E-06	1.43E-09	1.51E+01	2.16E-08	1.30E-05
Copper	3.64E+02	1.71E-04	NA		6.82E-06	NA		2.60E-08	NA		
Child Resident											
Arsenic	2.01E+01	1.76E-05	1.50E+00	2.64E-05	1.85E-06	1.50E+00	2.78E-06	8.37E-10	1.51E+01	1.26E-08	2.92E-05
Copper	3.64E+02	3.99E-04	NA		1.12E-05	NA		1.52E-08	NA		
Total Adult Resident				1.1E-05			1.7E-06			2.2E-08	1.3E-05
Total Child Resident				2.6E-05			2.8E-06			1.3E-08	2.9E-05
Total Adult/Child Resident		(89.3% Contribution)		3.8E-05	(10.6% Contribution)		4.5E-06	(0.1% Contribution)		3.4E-08	4.2E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-238
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008J
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	2.01E+01	2.20E-05	3.00E-04	7.34E-02	3.30E-06	3.00E-04	1.10E-02	4.18E-09	NA		8.44E-02
Copper	3.64E+02	4.99E-04	4.00E-02	1.25E-02	1.99E-05	4.00E-02	4.97E-04	7.58E-08	NA		1.30E-02
Child Resident											
Arsenic	2.01E+01	2.06E-04	3.00E-04	6.85E-01	2.16E-05	3.00E-04	7.20E-02	9.76E-09	NA		7.57E-01
Copper	3.64E+02	4.65E-03	4.00E-02	1.16E-01	1.30E-04	4.00E-02	3.26E-03	1.77E-07	NA		1.20E-01
Total Adult Resident				8.6E-02			1.1E-02			0.0E+00	0.10
Total Child Resident		(91.4% Contribution)		8.0E-01	(8.6% Contribution)		7.5E-02	(0% Contribution)		0.0E+00	0.9

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-239
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008K
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.13E+00	1.55E-06	1.50E+00	2.33E-06	2.32E-07	1.50E+00	3.48E-07	2.95E-10	1.51E+01	4.44E-09	2.68E-06
Copper	5.98E+02	2.81E-04	NA		1.12E-05	NA		4.27E-08	NA		
Child Resident											
Arsenic	4.13E+00	3.62E-06	1.50E+00	5.43E-06	3.80E-07	1.50E+00	5.70E-07	1.72E-10	1.51E+01	2.59E-09	6.00E-06
Copper	5.98E+02	6.55E-04	NA		1.83E-05	NA		2.49E-08	NA		
Total Adult Resident				2.3E-06			3.5E-07			4.4E-09	2.7E-06
Total Child Resident				5.4E-06			5.7E-07			2.6E-09	6.0E-06
Total Adult/Child Resident		(89.3% Contribution)		7.8E-06	(10.6% Contribution)		9.2E-07	(0.1% Contribution)		7.0E-09	8.7E-06

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-240
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-008K
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.13E+00	4.53E-06	3.00E-04	1.51E-02	6.77E-07	3.00E-04	2.26E-03	8.60E-10	NA		1.73E-02
Copper	5.98E+02	8.19E-04	4.00E-02	2.05E-02	3.27E-05	4.00E-02	8.17E-04	1.24E-07	NA		2.13E-02
Child Resident											
Arsenic	4.13E+00	4.22E-05	3.00E-04	1.41E-01	4.44E-06	3.00E-04	1.48E-02	2.01E-09	NA		1.56E-01
Copper	5.98E+02	7.65E-03	4.00E-02	1.91E-01	2.14E-04	4.00E-02	5.35E-03	2.90E-07	NA		1.96E-01
Total Adult Resident				3.6E-02			3.1E-03			0.0E+00	0.04
Total Child Resident		(94.3% Contribution)		3.3E-01	(5.7% Contribution)		2.0E-02	(0% Contribution)		0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-241
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-023A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.03E+00	1.89E-06	1.50E+00	2.83E-06	2.83E-07	1.50E+00	4.24E-07	3.59E-10	1.51E+01	5.40E-09	3.26E-06
Copper	3.83E+02	1.80E-04	NA		7.18E-06	NA		2.73E-08	NA		
Child Resident											
Arsenic	5.03E+00	4.41E-06	1.50E+00	6.61E-06	4.63E-07	1.50E+00	6.95E-07	2.09E-10	1.51E+01	3.15E-09	7.31E-06
Copper	3.83E+02	4.20E-04	NA		1.18E-05	NA		1.59E-08	NA		
Total Adult Resident				2.8E-06			4.2E-07			5.4E-09	3.3E-06
Total Child Resident				6.6E-06			6.9E-07			3.2E-09	7.3E-06
Total Adult/Child Resident		(89.3% Contribution)		9.4E-06	(10.6% Contribution)		1.1E-06	(0.1% Contribution)		8.6E-09	1.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-242
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-023A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.03E+00	5.51E-06	3.00E-04	1.84E-02	8.25E-07	3.00E-04	2.75E-03	1.05E-09	NA		2.11E-02
Copper	3.83E+02	5.25E-04	4.00E-02	1.31E-02	2.09E-05	4.00E-02	5.23E-04	7.97E-08	NA		1.36E-02
Child Resident											
Arsenic	5.03E+00	5.14E-05	3.00E-04	1.71E-01	5.40E-06	3.00E-04	1.80E-02	2.44E-09	NA		1.90E-01
Copper	3.83E+02	4.90E-03	4.00E-02	1.22E-01	1.37E-04	4.00E-02	3.43E-03	1.86E-07	NA		1.26E-01
Total Adult Resident				3.1E-02			3.3E-03			0.0E+00	0.03
Total Child Resident		(93.2% Contribution)		2.9E-01	(6.8% Contribution)		2.1E-02	(0% Contribution)		0.0E+00	0.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-243
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-288
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.76E+00	1.79E-06	1.50E+00	2.68E-06	2.68E-07	1.50E+00	4.01E-07	3.40E-10	1.51E+01	5.11E-09	3.09E-06
Copper	3.38E+02	1.59E-04	NA		6.33E-06	NA		2.41E-08	NA		
Child Resident											
Arsenic	4.76E+00	4.17E-06	1.50E+00	6.26E-06	4.38E-07	1.50E+00	6.57E-07	1.98E-10	1.51E+01	2.98E-09	6.92E-06
Copper	3.38E+02	3.70E-04	NA		1.04E-05	NA		1.41E-08	NA		
Total Adult Resident				2.7E-06			4.0E-07			5.1E-09	3.1E-06
Total Child Resident				6.3E-06			6.6E-07			3.0E-09	6.9E-06
Total Adult/Child Resident		(89.3% Contribution)		8.9E-06	(10.6% Contribution)		1.1E-06	(0.1% Contribution)		8.1E-09	1.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-244
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 18 - Property 101-12-288
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 18, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.76E+00	5.22E-06	3.00E-04	1.74E-02	7.81E-07	3.00E-04	2.60E-03	9.91E-10	NA		2.00E-02
Copper	3.38E+02	4.63E-04	4.00E-02	1.16E-02	1.85E-05	4.00E-02	4.62E-04	7.04E-08	NA		1.20E-02
Child Resident											
Arsenic	4.76E+00	4.87E-05	3.00E-04	1.62E-01	5.11E-06	3.00E-04	1.70E-02	2.31E-09	NA		1.79E-01
Copper	3.38E+02	4.32E-03	4.00E-02	1.08E-01	1.21E-04	4.00E-02	3.03E-03	1.64E-07	NA		1.11E-01
Total Adult Resident				2.9E-02			3.1E-03			0.0E+00	0.03
Total Child Resident		(93.1% Contribution)		2.7E-01	(6.9% Contribution)		2.0E-02	(0% Contribution)		0.0E+00	0.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-245
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 18
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-008F	**Adult Resident**	Arsenic	5.48E+00	3.09E-06	4.62E-07	5.89E-09	3.56E-06	2.00E-02	3.00E-03		2.30E-02
		Copper	6.55E+02					2.24E-02	8.95E-04		2.33E-02
		Total					3.6E-06				0.05
	Child Resident	Arsenic	5.48E+00	7.21E-06	7.57E-07	3.43E-09	7.97E-06	1.87E-01	1.96E-02		2.06E-01
		Copper	6.55E+02					2.09E-01	5.86E-03		2.15E-01
		Total					8.0E-06				0.4
	Adult/Child Resident	Arsenic	5.48E+00	1.03E-05	1.22E-06	9.32E-09	1.15E-05				
		Copper	6.55E+02								
		Total					1.2E-05				NA
101-12-008J	**Adult Resident**	Arsenic	2.01E+01	1.13E-05	1.70E-06	2.16E-08	1.30E-05	7.34E-02	1.10E-02		8.44E-02
		Copper	3.64E+02					1.25E-02	4.97E-04		1.30E-02
		Total					1.3E-05				0.1
	Child Resident	Arsenic	2.01E+01	2.64E-05	2.78E-06	1.26E-08	2.92E-05	6.85E-01	7.20E-02		7.57E-01
		Copper	3.64E+02					1.16E-01	3.26E-03		1.20E-01
		Total					2.9E-05				0.9
	Adult/Child Resident	Arsenic	2.01E+01	3.78E-05	4.47E-06	3.42E-08	4.23E-05				
		Copper	3.64E+02								
		Total					4.2E-05				NA
101-12-008K	**Adult Resident**	Arsenic	4.13E+00	2.33E-06	3.48E-07	4.44E-09	2.68E-06	1.51E-02	2.26E-03		1.73E-02
		Copper	5.98E+02					2.05E-02	8.17E-04		2.13E-02
		Total					2.7E-06				0.04
	Child Resident	Arsenic	4.13E+00	5.43E-06	5.70E-07	2.59E-09	6.00E-06	1.41E-01	1.48E-02		1.56E-01
		Copper	5.98E+02					1.91E-01	5.35E-03		1.96E-01
		Total					6.0E-06				0.4
	Adult/Child Resident	Arsenic	5.48E+00	7.76E-06	9.19E-07	7.02E-09	8.68E-06				
		Copper	6.55E+02								
		Total					8.7E-06				NA

Table A-245
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 18
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-023A	**Adult Resident**	Arsenic	5.03E+00	2.83E-06	4.24E-07	5.40E-09	3.26E-06	1.84E-02	2.75E-03		2.11E-02
		Copper	3.83E+02					1.31E-02	5.23E-04		1.36E-02
		Total					3.3E-06				0.03
	Child Resident	Arsenic	5.03E+00	6.61E-06	6.95E-07	3.15E-09	7.31E-06	1.71E-01	1.80E-02		1.90E-01
		Copper	3.83E+02					1.22E-01	3.43E-03		1.26E-01
		Total					7.3E-06				0.3
	Adult/Child Resident	Arsenic	5.03E+00	9.45E-06	1.12E-06	8.56E-09	1.06E-05				
		Copper	3.83E+02								
		Total					1.1E-05				NA
101-12-288	**Adult Resident**	Arsenic	4.76E+00	2.68E-06	4.01E-07	5.11E-09	3.09E-06	1.74E-02	2.60E-03		2.00E-02
		Copper	3.38E+02					1.16E-02	4.62E-04		1.20E-02
		Total					3.1E-06				0.03
	Child Resident	Arsenic	4.76E+00	6.26E-06	6.57E-07	2.98E-09	6.92E-06	1.62E-01	1.70E-02		1.79E-01
		Copper	3.38E+02					1.08E-01	3.03E-03		1.11E-01
		Total					6.9E-06				0.3
	Adult/Child Resident	Arsenic	4.76E+00	8.94E-06	1.06E-06	8.10E-09	1.00E-05				
		Copper	3.38E+02								
		Total					1.0E-05				NA

Notes:
NA = Not applicable

Table A-246
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 18
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-12-008F	1.2E-05	0.4
101-12-008J	4.2E-05	0.9
101-12-008K	8.7E-06	0.4
101-12-023A	1.1E-05	0.3
101-12-288	1.0E-05	0.3

Table A-247
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-071
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.12E+02	4.21E-05	1.50E+00	6.31E-05	6.30E-06	1.50E+00	9.44E-06	7.99E-09	1.51E+01	1.20E-07	7.27E-05
Copper	6.92E+02	3.25E-04	NA		1.30E-05	NA		4.94E-08	NA		
Child Resident											
Arsenic	1.12E+02	9.82E-05	1.50E+00	1.47E-04	1.03E-05	1.50E+00	1.55E-05	4.66E-09	1.51E+01	7.02E-08	1.63E-04
Copper	6.92E+02	7.58E-04	NA		2.12E-05	NA		2.88E-08	NA		
Total Adult Resident				6.3E-05			9.4E-06			1.2E-07	7.3E-05
Total Child Resident				1.5E-04			1.5E-05			7.0E-08	1.6E-04
Total Adult/Child Resident		(89.3% Contribution)		2.1E-04	(10.6% Contribution)		2.5E-05	(0.1% Contribution)		1.9E-07	2.4E-04

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-248
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-071
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	1.12E+02	1.23E-04	3.00E-04	4.09E-01	1.84E-05	3.00E-04	6.12E-02	2.33E-08	NA		4.70E-01
Copper	6.92E+02	9.48E-04	4.00E-02	2.37E-02	3.78E-05	4.00E-02	9.46E-04	1.44E-07	NA		2.46E-02
Child Resident											
Arsenic	1.12E+02	1.15E-03	3.00E-04	3.82E+00	1.20E-04	3.00E-04	4.01E-01	5.44E-08	NA		4.22E+00
Copper	6.92E+02	8.85E-03	4.00E-02	2.21E-01	2.48E-04	4.00E-02	6.19E-03	3.36E-07	NA		2.27E-01
Total Adult Resident				4.3E-01			6.2E-02			0.0E+00	0.49
Total Child Resident		(90.8% Contribution)		4.0E+00	(9.2% Contribution)		4.1E-01	(0% Contribution)		0.0E+00	4.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-249
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-073
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	8.02E+00	3.01E-06	1.50E+00	4.52E-06	4.51E-07	1.50E+00	6.76E-07	5.72E-10	1.51E+01	8.62E-09	5.21E-06
Copper	5.47E+02	2.57E-04	NA		1.03E-05	NA		3.90E-08	NA		
Child Resident											
Arsenic	8.02E+00	7.03E-06	1.50E+00	1.05E-05	7.38E-07	1.50E+00	1.11E-06	3.34E-10	1.51E+01	5.03E-09	1.17E-05
Copper	5.47E+02	5.99E-04	NA		1.68E-05	NA		2.28E-08	NA		
Total Adult Resident				4.5E-06			6.8E-07			8.6E-09	5.2E-06
Total Child Resident				1.1E-05			1.1E-06			5.0E-09	1.2E-05
Total Adult/Child Resident		(89.3% Contribution)		1.5E-05	(10.6% Contribution)		1.8E-06	(0.1% Contribution)		1.4E-08	1.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-250
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-073
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	8.02E+00	8.79E-06	3.00E-04	2.93E-02	1.32E-06	3.00E-04	4.38E-03	1.67E-09	NA		3.37E-02
Copper	5.47E+02	7.49E-04	4.00E-02	1.87E-02	2.99E-05	4.00E-02	7.47E-04	1.14E-07	NA		1.95E-02
Child Resident											
Arsenic	8.02E+00	8.20E-05	3.00E-04	2.73E-01	8.61E-06	3.00E-04	2.87E-02	3.90E-09	NA		3.02E-01
Copper	5.47E+02	6.99E-03	4.00E-02	1.75E-01	1.96E-04	4.00E-02	4.90E-03	2.66E-07	NA		1.80E-01
Total Adult Resident				4.8E-02			5.1E-03			0.0E+00	0.05
Total Child Resident			(93% Contribution)	4.5E-01		(7% Contribution)	3.4E-02		(0% Contribution)	0.0E+00	0.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-251
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-075
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.05E+00	1.52E-06	1.50E+00	2.28E-06	2.28E-07	1.50E+00	3.42E-07	2.89E-10	1.51E+01	4.35E-09	2.63E-06
Copper	6.03E+02	2.83E-04	NA		1.13E-05	NA		4.30E-08	NA		
Child Resident											
Arsenic	4.05E+00	3.55E-06	1.50E+00	5.33E-06	3.73E-07	1.50E+00	5.59E-07	1.69E-10	1.51E+01	2.54E-09	5.89E-06
Copper	6.03E+02	6.61E-04	NA		1.85E-05	NA		2.51E-08	NA		
Total Adult Resident				2.3E-06			3.4E-07			4.4E-09	2.6E-06
Total Child Resident				5.3E-06			5.6E-07			2.5E-09	5.9E-06
Total Adult/Child Resident		(89.3% Contribution)		7.6E-06	(10.6% Contribution)		9.0E-07	(0.1% Contribution)		6.9E-09	8.5E-06

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-252
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-075
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.05E+00	4.44E-06	3.00E-04	1.48E-02	6.64E-07	3.00E-04	2.21E-03	8.43E-10	NA		1.70E-02
Copper	6.03E+02	8.26E-04	4.00E-02	2.07E-02	3.30E-05	4.00E-02	8.24E-04	1.26E-07	NA		2.15E-02
Child Resident											
Arsenic	4.05E+00	4.14E-05	3.00E-04	1.38E-01	4.35E-06	3.00E-04	1.45E-02	1.97E-09	NA		1.53E-01
Copper	6.03E+02	7.71E-03	4.00E-02	1.93E-01	2.16E-04	4.00E-02	5.40E-03	2.93E-07	NA		1.98E-01
Total Adult Resident				3.5E-02			3.0E-03			0.0E+00	0.04
Total Child Resident		(94.3% Contribution)		3.3E-01	(5.7% Contribution)		2.0E-02	(0% Contribution)		0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-253
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-101A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.40E+00	2.40E-06	1.50E+00	3.61E-06	3.60E-07	1.50E+00	5.40E-07	4.57E-10	1.51E+01	6.88E-09	4.15E-06
Copper	4.04E+02	1.90E-04	NA		7.57E-06	NA		2.88E-08	NA		
Child Resident											
Arsenic	6.40E+00	5.61E-06	1.50E+00	8.42E-06	5.89E-07	1.50E+00	8.84E-07	2.66E-10	1.51E+01	4.01E-09	9.30E-06
Copper	4.04E+02	4.43E-04	NA		1.24E-05	NA		1.68E-08	NA		
Total Adult Resident				3.6E-06			5.4E-07			6.9E-09	4.2E-06
Total Child Resident				8.4E-06			8.8E-07			4.0E-09	9.3E-06
Total Adult/Child Resident		(89.3% Contribution)		1.2E-05	(10.6% Contribution)		1.4E-06	(0.1% Contribution)		1.1E-08	1.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-254
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-101A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.40E+00	7.01E-06	3.00E-04	2.34E-02	1.05E-06	3.00E-04	3.50E-03	1.33E-09	NA		2.69E-02
Copper	4.04E+02	5.53E-04	4.00E-02	1.38E-02	2.21E-05	4.00E-02	5.52E-04	8.41E-08	NA		1.44E-02
Child Resident											
Arsenic	6.40E+00	6.55E-05	3.00E-04	2.18E-01	6.87E-06	3.00E-04	2.29E-02	3.11E-09	NA		2.41E-01
Copper	4.04E+02	5.17E-03	4.00E-02	1.29E-01	1.45E-04	4.00E-02	3.62E-03	1.96E-07	NA		1.33E-01
Total Adult Resident				3.7E-02			4.1E-03			0.0E+00	0.04
Total Child Resident		(92.9% Contribution)		3.5E-01	(7.1% Contribution)		2.7E-02	(0% Contribution)		0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-255
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-102
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.04E+00	2.27E-06	1.50E+00	3.40E-06	3.40E-07	1.50E+00	5.09E-07	4.31E-10	1.51E+01	6.49E-09	3.92E-06
Copper	5.40E+02	2.54E-04	NA		1.01E-05	NA		3.85E-08	NA		
Child Resident											
Arsenic	6.04E+00	5.30E-06	1.50E+00	7.94E-06	5.56E-07	1.50E+00	8.34E-07	2.51E-10	1.51E+01	3.78E-09	8.78E-06
Copper	5.40E+02	5.92E-04	NA		1.66E-05	NA		2.25E-08	NA		
Total Adult Resident				3.4E-06			5.1E-07			6.5E-09	3.9E-06
Total Child Resident				7.9E-06			8.3E-07			3.8E-09	8.8E-06
Total Adult/Child Resident		(89.3% Contribution)		1.1E-05	(10.6% Contribution)		1.3E-06	(0.1% Contribution)		1.0E-08	1.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-256
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 19 - Property 101-12-102
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 19, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.04E+00	6.62E-06	3.00E-04	2.21E-02	9.90E-07	3.00E-04	3.30E-03	1.26E-09	NA		2.54E-02
Copper	5.40E+02	7.40E-04	4.00E-02	1.85E-02	2.95E-05	4.00E-02	7.38E-04	1.12E-07	NA		1.92E-02
Child Resident											
Arsenic	6.04E+00	6.18E-05	3.00E-04	2.06E-01	6.49E-06	3.00E-04	2.16E-02	2.93E-09	NA		2.28E-01
Copper	5.40E+02	6.90E-03	4.00E-02	1.73E-01	1.93E-04	4.00E-02	4.83E-03	2.62E-07	NA		1.77E-01
Total Adult Resident				4.1E-02			4.0E-03			0.0E+00	0.04
Total Child Resident		(93.5% Contribution)		3.8E-01	(6.5% Contribution)		2.6E-02	(0% Contribution)		0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-257
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 19
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-071	**Adult Resident**	Arsenic	1.12E+02	6.31E-05	9.44E-06	1.20E-07	7.27E-05	4.09E-01	6.12E-02		4.70E-01
		Copper	6.92E+02					2.37E-02	9.46E-04		2.46E-02
		Total					7.3E-05				0.5
	Child Resident	Arsenic	1.12E+02	1.47E-04	1.55E-05	7.02E-08	1.63E-04	3.82E+00	4.01E-01		4.22E+00
		Copper	6.92E+02					2.21E-01	6.19E-03		2.27E-01
		Total					1.6E-04				4.4
	Adult/Child Resident	Arsenic	1.12E+02	2.10E-04	2.49E-05	1.90E-07	2.36E-04				
		Copper	6.92E+02								
		Total					2.4E-04				NA
101-12-073	**Adult Resident**	Arsenic	8.02E+00	4.52E-06	6.76E-07	8.62E-09	5.21E-06	2.93E-02	4.38E-03		3.37E-02
		Copper	5.47E+02					1.87E-02	7.47E-04		1.95E-02
		Total					5.2E-06				0.1
	Child Resident	Arsenic	8.02E+00	1.05E-05	1.11E-06	5.03E-09	1.17E-05	2.73E-01	2.87E-02		3.02E-01
		Copper	5.47E+02					1.75E-01	4.90E-03		1.80E-01
		Total					1.2E-05				0.5
	Adult/Child Resident	Arsenic	8.02E+00	1.51E-05	1.78E-06	1.36E-08	1.69E-05				
		Copper	5.47E+02								
		Total					1.7E-05				NA
101-12-075	**Adult Resident**	Arsenic	4.05E+00	2.28E-06	3.42E-07	4.35E-09	2.63E-06	1.48E-02	2.21E-03		1.70E-02
		Copper	6.03E+02					2.07E-02	8.24E-04		2.15E-02
		Total					2.6E-06				0.04
	Child Resident	Arsenic	4.05E+00	5.33E-06	5.59E-07	2.54E-09	5.89E-06	1.38E-01	1.45E-02		1.53E-01
		Copper	6.03E+02					1.93E-01	5.40E-03		1.98E-01
		Total					5.9E-06				0.4
	Adult/Child Resident	Arsenic	4.05E+00	7.61E-06	9.01E-07	6.89E-09	8.52E-06				
		Copper	6.03E+02								
		Total					8.5E-06				NA

Table A-257
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 19
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-101A	**Adult Resident**	Arsenic	6.40E+00	3.61E-06	5.40E-07	6.88E-09	4.15E-06	2.34E-02	3.50E-03		2.69E-02
		Copper	4.04E+02					1.38E-02	5.52E-04		1.44E-02
		Total					4.2E-06				0.04
	Child Resident	Arsenic	6.40E+00	8.42E-06	8.84E-07	4.01E-09	9.30E-06	2.18E-01	2.29E-02		2.41E-01
		Copper	4.04E+02					1.29E-01	3.62E-03		1.33E-01
		Total					9.3E-06				0.4
	Adult/Child Resident	Arsenic	6.40E+00	1.20E-05	1.42E-06	1.09E-08	1.35E-05				
		Copper	4.04E+02								
		Total					1.3E-05				NA
101-12-102	**Adult Resident**	Arsenic	6.04E+00	3.40E-06	5.09E-07	6.49E-09	3.92E-06	2.21E-02	3.30E-03		2.54E-02
		Copper	5.40E+02					1.85E-02	7.38E-04		1.92E-02
		Total					3.9E-06				0.04
	Child Resident	Arsenic	6.04E+00	7.94E-06	8.34E-07	3.78E-09	8.78E-06	2.06E-01	2.16E-02		2.28E-01
		Copper	5.40E+02					1.73E-01	4.83E-03		1.77E-01
		Total					8.8E-06				0.4
	Adult/Child Resident	Arsenic	6.04E+00	1.13E-05	1.34E-06	1.03E-08	1.27E-05				
		Copper	5.40E+02								
		Total					1.3E-05				NA

Notes:
NA = Not applicable

Table A-258
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 19
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-12-071	2.4E-04	4.4
101-12-073	1.7E-05	0.5
101-12-075	8.5E-06	0.4
101-12-101A	1.3E-05	0.4
101-12-102	1.3E-05	0.4

Table A-259
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-093
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 20, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	7.43E+00	2.79E-06	1.50E+00	4.19E-06	4.18E-07	1.50E+00	6.27E-07	5.30E-10	1.51E+01	7.98E-09	4.82E-06
Copper	1.04E+03	4.88E-04	NA		1.95E-05	NA		7.42E-08	NA		
Child Resident											
Arsenic	7.43E+00	6.51E-06	1.50E+00	9.77E-06	6.84E-07	1.50E+00	1.03E-06	3.09E-10	1.51E+01	4.66E-09	1.08E-05
Copper	1.04E+03	1.14E-03	NA		3.19E-05	NA		4.33E-08	NA		
Total Adult Resident				4.2E-06			6.3E-07			8.0E-09	4.8E-06
Total Child Resident				9.8E-06			1.0E-06			4.7E-09	1.1E-05
Total Adult/Child Resident		(89.3% Contribution)		1.4E-05	(10.6% Contribution)		1.7E-06	(0.1% Contribution)		1.3E-08	1.6E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-260
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-093
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 20, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	7.43E+00	8.14E-06	3.00E-04	2.71E-02	1.22E-06	3.00E-04	4.06E-03	1.55E-09	NA		3.12E-02
Copper	1.04E+03	1.42E-03	4.00E-02	3.56E-02	5.68E-05	4.00E-02	1.42E-03	2.17E-07	NA		3.70E-02
Child Resident											
Arsenic	7.43E+00	7.60E-05	3.00E-04	2.53E-01	7.98E-06	3.00E-04	2.66E-02	3.61E-09	NA		2.80E-01
Copper	1.04E+03	1.33E-02	4.00E-02	3.32E-01	3.72E-04	4.00E-02	9.31E-03	5.05E-07	NA		3.42E-01
Total Adult Resident				6.3E-02			5.5E-03			0.0E+00	0.07
Total Child Resident		(94.2% Contribution)		5.9E-01	(5.8% Contribution)		3.6E-02	(0% Contribution)		0.0E+00	0.6

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-261
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-094A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 20, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	7.89E+00	2.96E-06	1.50E+00	4.45E-06	4.44E-07	1.50E+00	6.65E-07	5.63E-10	1.51E+01	8.48E-09	5.12E-06
Copper	6.32E+02	2.97E-04	NA		1.18E-05	NA		4.51E-08	NA		
Child Resident											
Arsenic	7.89E+00	6.92E-06	1.50E+00	1.04E-05	7.26E-07	1.50E+00	1.09E-06	3.29E-10	1.51E+01	4.94E-09	1.15E-05
Copper	6.32E+02	6.93E-04	NA		1.94E-05	NA		2.63E-08	NA		
Total Adult Resident				4.4E-06			6.7E-07			8.5E-09	5.1E-06
Total Child Resident				1.0E-05			1.1E-06			4.9E-09	1.1E-05
Total Adult/Child Resident		(89.3% Contribution)		1.5E-05	(10.6% Contribution)		1.8E-06	(0.1% Contribution)		1.3E-08	1.7E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-262
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-094A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 20, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	7.89E+00	8.65E-06	3.00E-04	2.88E-02	1.29E-06	3.00E-04	4.31E-03	1.64E-09	NA		3.3E-02
Copper	6.32E+02	8.66E-04	4.00E-02	2.16E-02	3.45E-05	4.00E-02	8.64E-04	1.32E-07	NA		2.3E-02
Child Resident											
Arsenic	7.89E+00	8.07E-05	3.00E-04	2.69E-01	8.47E-06	3.00E-04	2.82E-02	3.83E-09	NA		3.0E-01
Copper	6.32E+02	8.08E-03	4.00E-02	2.02E-01	2.26E-04	4.00E-02	5.66E-03	3.07E-07	NA		2.1E-01
Total Adult Resident				5.0E-02			5.2E-03			0.0E+00	0.06
Total Child Resident		(93.3% Contribution)		4.7E-01	(6.7% Contribution)		3.4E-02	(0% Contribution)		0.0E+00	0.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-263
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-108
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 20, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.06E+00	2.28E-06	1.50E+00	3.42E-06	3.41E-07	1.50E+00	5.11E-07	4.33E-10	1.51E+01	6.51E-09	3.93E-06
Copper	5.53E+02	2.60E-04	NA		1.04E-05	NA		3.95E-08	NA		
Child Resident											
Arsenic	6.06E+00	5.31E-06	1.50E+00	7.97E-06	5.58E-07	1.50E+00	8.37E-07	2.52E-10	1.51E+01	3.80E-09	8.81E-06
Copper	5.53E+02	6.06E-04	NA		1.70E-05	NA		2.30E-08	NA		
Total Adult Resident				3.4E-06			5.1E-07			6.5E-09	3.9E-06
Total Child Resident				8.0E-06			8.4E-07			3.8E-09	8.8E-06
Total Adult/Child Resident		(89.3% Contribution)		1.1E-05	(10.6% Contribution)		1.3E-06	(0.1% Contribution)		1.0E-08	1.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-264
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 20 - Property 101-12-108
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 20, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.06E+00	6.64E-06	3.00E-04	2.21E-02	9.94E-07	3.00E-04	3.31E-03	1.26E-09	NA		2.5E-02
Copper	5.53E+02	7.58E-04	4.00E-02	1.89E-02	3.02E-05	4.00E-02	7.56E-04	1.15E-07	NA		2.0E-02
Child Resident											
Arsenic	6.06E+00	6.20E-05	3.00E-04	2.07E-01	6.51E-06	3.00E-04	2.17E-02	2.94E-09	NA		2.3E-01
Copper	5.53E+02	7.07E-03	4.00E-02	1.77E-01	1.98E-04	4.00E-02	4.95E-03	2.69E-07	NA		1.8E-01
Total Adult Resident				4.1E-02			4.1E-03			0.0E+00	0.05
Total Child Resident			(93.5% Contribution)	3.8E-01		(6.5% Contribution)	2.7E-02		(0% Contribution)	0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-265
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 20
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-093	**Adult Resident**	Arsenic	7.43E+00	4.19E-06	6.27E-07	7.98E-09	4.82E-06	2.71E-02	4.06E-03		3.12E-02
		Copper	1.04E+03					3.56E-02	1.42E-03		3.70E-02
		Total					4.8E-06				0.1
	Child Resident	Arsenic	7.43E+00	9.77E-06	1.03E-06	4.66E-09	1.08E-05	2.53E-01	2.66E-02		2.80E-01
		Copper	1.04E+03					3.32E-01	9.31E-03		3.42E-01
		Total					1.1E-05				0.6
	Adult/Child Resident	Arsenic	7.43E+00	1.40E-05	1.65E-06	1.26E-08	1.56E-05				
		Copper	1.04E+03								
		Total					1.6E-05				NA
101-12-094A	**Adult Resident**	Arsenic	7.89E+00	4.45E-06	6.65E-07	8.48E-09	5.12E-06	2.88E-02	4.31E-03		3.31E-02
		Copper	6.32E+02					2.16E-02	8.64E-04		2.25E-02
		Total					5.1E-06				0.06
	Child Resident	Arsenic	7.89E+00	1.04E-05	1.09E-06	4.94E-09	1.15E-05	2.69E-01	2.82E-02		2.97E-01
		Copper	6.32E+02					2.02E-01	5.66E-03		2.08E-01
		Total					1.1E-05				0.5
	Adult/Child Resident	Arsenic	7.89E+00	1.48E-05	1.75E-06	1.34E-08	1.66E-05				
		Copper	6.32E+02								
		Total					1.7E-05				NA
101-12-108	**Adult Resident**	Arsenic	6.06E+00	3.42E-06	5.11E-07	6.51E-09	3.93E-06	2.21E-02	3.31E-03		2.54E-02
		Copper	5.53E+02					1.89E-02	7.56E-04		1.97E-02
		Total					3.9E-06				0.05
	Child Resident	Arsenic	6.06E+00	7.97E-06	8.37E-07	3.80E-09	8.81E-06	2.07E-01	2.17E-02		2.28E-01
		Copper	5.53E+02					1.77E-01	4.95E-03		1.82E-01
		Total					8.8E-06				0.4
	Adult/Child Resident	Arsenic	6.06E+00	1.14E-05	1.35E-06	1.03E-08	1.27E-05				
		Copper	5.53E+02								
		Total					1.3E-05				NA

Notes:
NA = Not applicable

Table A-266
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 20
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-12-093	1.6E-05	0.6
101-12-094A	1.7E-05	0.5
101-12-108	1.3E-05	0.4

Table A-267
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-130
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.41E+00	2.03E-06	1.50E+00	3.05E-06	3.04E-07	1.50E+00	4.56E-07	3.86E-10	1.51E+01	5.81E-09	3.51E-06
Copper	7.87E+02	3.70E-04	NA		1.47E-05	NA		5.62E-08	NA		
Child Resident											
Arsenic	5.41E+00	4.74E-06	1.50E+00	7.11E-06	4.98E-07	1.50E+00	7.47E-07	2.25E-10	1.51E+01	3.39E-09	7.86E-06
Copper	7.87E+02	8.62E-04	NA		2.41E-05	NA		3.28E-08	NA		
Total Adult Resident				3.0E-06			4.6E-07			5.8E-09	3.5E-06
Total Child Resident				7.1E-06			7.5E-07			3.4E-09	7.9E-06
Total Adult/Child Resident		(89.3% Contribution)		1.0E-05	(10.6% Contribution)		1.2E-06	(0.1% Contribution)		9.2E-09	1.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-268
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-130
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.41E+00	5.93E-06	3.00E-04	1.98E-02	8.87E-07	3.00E-04	2.96E-03	1.13E-09	NA		2.27E-02
Copper	7.87E+02	1.08E-03	4.00E-02	2.70E-02	4.30E-05	4.00E-02	1.08E-03	1.64E-07	NA		2.80E-02
Child Resident											
Arsenic	5.41E+00	5.53E-05	3.00E-04	1.84E-01	5.81E-06	3.00E-04	1.94E-02	2.63E-09	NA		2.04E-01
Copper	7.87E+02	1.01E-02	4.00E-02	2.52E-01	2.82E-04	4.00E-02	7.04E-03	3.82E-07	NA		2.59E-01
Total Adult Resident				4.7E-02			4.0E-03			0.0E+00	0.05
Total Child Resident			(94.3% Contribution)	4.4E-01		(5.7% Contribution)	2.6E-02		(0% Contribution)	0.0E+00	0.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-269
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-142
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	1.66E+01	6.24E-06	1.50E+00	9.36E-06	9.33E-07	1.50E+00	1.40E-06	1.18E-09	1.51E+01	1.78E-08	1.08E-05
Copper	1.39E+03	6.53E-04	NA		2.60E-05	NA		9.92E-08	NA		
Child Resident											
Arsenic	1.66E+01	1.46E-05	1.50E+00	2.18E-05	1.53E-06	1.50E+00	2.29E-06	6.91E-10	1.51E+01	1.04E-08	2.41E-05
Copper	1.39E+03	1.52E-03	NA		4.27E-05	NA		5.79E-08	NA		
Total Adult Resident				9.4E-06			1.4E-06			1.8E-08	1.1E-05
Total Child Resident				2.2E-05			2.3E-06			1.0E-08	2.4E-05
Total Adult/Child Resident		(89.3% Contribution)		3.1E-05	(10.6% Contribution)		3.7E-06	(0.1% Contribution)		2.8E-08	3.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-270
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-142
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	1.66E+01	1.82E-05	3.00E-04	6.06E-02	2.72E-06	3.00E-04	9.07E-03	3.46E-09	NA		6.97E-02
Copper	1.39E+03	1.90E-03	4.00E-02	4.76E-02	7.60E-05	4.00E-02	1.90E-03	2.89E-07	NA		4.95E-02
Child Resident											
Arsenic	1.66E+01	1.70E-04	3.00E-04	5.66E-01	1.78E-05	3.00E-04	5.94E-02	8.06E-09	NA		6.25E-01
Copper	1.39E+03	1.78E-02	4.00E-02	4.44E-01	4.98E-04	4.00E-02	1.24E-02	6.75E-07	NA		4.57E-01
Total Adult Resident				1.1E-01			1.1E-02			0.0E+00	0.12
Total Child Resident		(93.4% Contribution)		1.0E+00	(6.6% Contribution)		7.2E-02	(0% Contribution)		0.0E+00	1.1

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-271
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-149
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.53E+01	1.70E-05	1.50E+00	2.55E-05	2.55E-06	1.50E+00	3.82E-06	3.23E-09	1.51E+01	4.87E-08	2.94E-05
Copper	5.13E+03	2.41E-03	NA		9.61E-05	NA		3.66E-07	NA		
Child Resident											
Arsenic	4.53E+01	3.97E-05	1.50E+00	5.96E-05	4.17E-06	1.50E+00	6.26E-06	1.89E-09	1.51E+01	2.84E-08	6.59E-05
Copper	5.13E+03	5.62E-03	NA		1.57E-04	NA		2.14E-07	NA		
Total Adult Resident				2.6E-05			3.8E-06			4.9E-08	2.9E-05
Total Child Resident				6.0E-05			6.3E-06			2.8E-08	6.6E-05
Total Adult/Child Resident		(89.3% Contribution)		8.5E-05	(10.6% Contribution)		1.0E-05	(0.1% Contribution)		7.7E-08	9.5E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-272
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-149
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	4.53E+01	4.96E-05	3.00E-04	1.65E-01	7.43E-06	3.00E-04	2.48E-02	9.43E-09	NA		1.90E-01
Copper	5.13E+03	7.03E-03	4.00E-02	1.76E-01	2.80E-04	4.00E-02	7.01E-03	1.07E-06	NA		1.83E-01
Child Resident											
Arsenic	4.53E+01	4.63E-04	3.00E-04	1.54E+00	4.87E-05	3.00E-04	1.62E-01	2.20E-08	NA		1.71E+00
Copper	5.13E+03	6.56E-02	4.00E-02	1.64E+00	1.84E-03	4.00E-02	4.59E-02	2.49E-06	NA		1.69E+00
Total Adult Resident				3.4E-01			3.2E-02			0.0E+00	0.37
Total Child Resident		(93.9% Contribution)		3.2E+00	(6.1% Contribution)		2.1E-01	(0% Contribution)		0.0E+00	3.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-273
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-150
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	3.47E+01	1.30E-05	1.50E+00	1.96E-05	1.95E-06	1.50E+00	2.93E-06	2.48E-09	1.51E+01	3.73E-08	2.25E-05
Copper	4.41E+03	2.07E-03	NA		8.26E-05	NA		3.15E-07	NA		
Child Resident											
Arsenic	3.47E+01	3.04E-05	1.50E+00	4.56E-05	3.19E-06	1.50E+00	4.79E-06	1.44E-09	1.51E+01	2.17E-08	5.04E-05
Copper	4.41E+03	4.83E-03	NA		1.35E-04	NA		1.84E-07	NA		
Total Adult Resident				2.0E-05			2.9E-06			3.7E-08	2.3E-05
Total Child Resident				4.6E-05			4.8E-06			2.2E-08	5.0E-05
Total Adult/Child Resident		(89.3% Contribution)		6.5E-05	(10.6% Contribution)		7.7E-06	(0.1% Contribution)		5.9E-08	7.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-274
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 21 - Property 101-12-150
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 21, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	3.47E+01	3.80E-05	3.00E-04	1.27E-01	5.69E-06	3.00E-04	1.90E-02	7.22E-09	NA		1.46E-01
Copper	4.41E+03	6.04E-03	4.00E-02	1.51E-01	2.41E-04	4.00E-02	6.03E-03	9.18E-07	NA		1.57E-01
Child Resident											
Arsenic	3.47E+01	3.55E-04	3.00E-04	1.18E+00	3.73E-05	3.00E-04	1.24E-01	1.69E-08	NA		1.31E+00
Copper	4.41E+03	5.64E-02	4.00E-02	1.41E+00	1.58E-03	4.00E-02	3.95E-02	2.14E-06	NA		1.45E+00
Total Adult Resident				2.8E-01			2.5E-02			0.0E+00	0.30
Total Child Resident		(94.1% Contribution)		2.6E+00	(5.9% Contribution)		1.6E-01	(0% Contribution)		0.0E+00	2.8

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-275
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 21
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-130	**Adult Resident**	Arsenic	5.41E+00	3.05E-06	4.56E-07	5.81E-09	3.51E-06	1.98E-02	2.96E-03		2.27E-02
		Copper	7.87E+02					2.70E-02	1.08E-03		2.80E-02
		Total					3.5E-06				0.1
	Child Resident	Arsenic	5.41E+00	7.11E-06	7.47E-07	3.39E-09	7.86E-06	1.84E-01	1.94E-02		2.04E-01
		Copper	7.87E+02					2.52E-01	7.04E-03		2.59E-01
		Total					7.9E-06				0.5
	Adult/Child Resident	Arsenic	5.41E+00	1.02E-05	1.20E-06	9.20E-09	1.14E-05				
		Copper	7.87E+02								
		Total					1.1E-05				NA
101-12-142	**Adult Resident**	Arsenic	1.66E+01	9.36E-06	1.40E-06	1.78E-08	1.08E-05	6.06E-02	9.07E-03		6.97E-02
		Copper	1.39E+03					4.76E-02	1.90E-03		4.95E-02
		Total					1.1E-05				0.1
	Child Resident	Arsenic	1.66E+01	2.18E-05	2.29E-06	1.04E-08	2.41E-05	5.66E-01	5.94E-02		6.25E-01
		Copper	1.39E+03					4.44E-01	1.24E-02		4.57E-01
		Total					2.4E-05				1.1
	Adult/Child Resident	Arsenic	1.66E+01	3.12E-05	3.69E-06	2.82E-08	3.49E-05				
		Copper	1.39E+03								
		Total					3.5E-05				NA
101-12-149	**Adult Resident**	Arsenic	4.53E+01	2.55E-05	3.82E-06	4.87E-08	2.94E-05	1.65E-01	2.48E-02		1.90E-01
		Copper	5.13E+03					1.76E-01	7.01E-03		1.83E-01
		Total					2.9E-05				0.4
	Child Resident	Arsenic	4.53E+01	5.96E-05	6.26E-06	2.84E-08	6.59E-05	1.54E+00	1.62E-01		1.71E+00
		Copper	5.13E+03					1.64E+00	4.59E-02		1.69E+00
		Total					6.6E-05				3.4
	Adult/Child Resident	Arsenic	4.53E+01	8.51E-05	1.01E-05	7.70E-08	9.53E-05				
		Copper	5.13E+03								
		Total					9.5E-05				NA

Table A-275
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 21
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-12-150	**Adult Resident**	Arsenic	3.47E+01	1.96E-05	2.93E-06	3.73E-08	2.25E-05	1.27E-01	1.90E-02		1.46E-01
		Copper	4.41E+03					1.51E-01	6.03E-03		1.57E-01
		Total					2.3E-05				0.3
	Child Resident	Arsenic	3.47E+01	4.56E-05	4.79E-06	2.17E-08	5.04E-05	1.18E+00	1.24E-01		1.31E+00
		Copper	4.41E+03					1.41E+00	3.95E-02		1.45E+00
		Total					5.0E-05				2.8
	Adult/Child Resident	Arsenic	3.47E+01	6.52E-05	7.72E-06	5.90E-08	7.30E-05				
		Copper	4.41E+03								
		Total					7.3E-05				NA

Notes:
NA = Not applicable

Table A-276
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 21
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-12-130	1.1E-05	0.5
101-12-142	3.5E-05	1.1
101-12-149	9.5E-05	3.4
101-12-150	7.3E-05	2.8

Table A-277
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-136
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.97E+00	1.87E-06	1.50E+00	2.80E-06	2.79E-07	1.50E+00	4.19E-07	3.55E-10	1.51E+01	5.34E-09	3.23E-06
Copper	3.96E+02	1.86E-04	NA		7.42E-06	NA		2.83E-08	NA		
Child Resident											
Arsenic	4.97E+00	4.36E-06	1.50E+00	6.54E-06	4.58E-07	1.50E+00	6.86E-07	2.07E-10	1.51E+01	3.11E-09	7.23E-06
Copper	3.96E+02	4.34E-04	NA		1.22E-05	NA		1.65E-08	NA		
Total Adult Resident				2.8E-06			4.2E-07			5.3E-09	3.2E-06
Total Child Resident				6.5E-06			6.9E-07			3.1E-09	7.2E-06
Total Adult/Child Resident		(89.3% Contribution)		9.3E-06	(10.6% Contribution)		1.1E-06	(0.1% Contribution)		8.5E-09	1.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-278
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-136
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	4.97E+00	5.45E-06	3.00E-04	1.82E-02	8.15E-07	3.00E-04	2.72E-03	1.03E-09	NA		2.09E-02
Copper	3.96E+02	5.42E-04	4.00E-02	1.36E-02	2.16E-05	4.00E-02	5.41E-04	8.24E-08	NA		1.41E-02
Child Resident											
Arsenic	4.97E+00	5.08E-05	3.00E-04	1.69E-01	5.34E-06	3.00E-04	1.78E-02	2.41E-09	NA		1.87E-01
Copper	3.96E+02	5.06E-03	4.00E-02	1.27E-01	1.42E-04	4.00E-02	3.54E-03	1.92E-07	NA		1.30E-01
Total Adult Resident				3.2E-02			3.3E-03			0.0E+00	0.03
Total Child Resident			(93.3% Contribution)	3.0E-01		(6.7% Contribution)	2.1E-02		(0% Contribution)	0.0E+00	0.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-279
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-147A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.08E+00	2.28E-06	1.50E+00	3.43E-06	3.42E-07	1.50E+00	5.13E-07	4.34E-10	1.51E+01	6.53E-09	3.95E-06
Copper	6.31E+02	2.96E-04	NA		1.18E-05	NA		4.50E-08	NA		
Child Resident											
Arsenic	6.08E+00	5.33E-06	1.50E+00	8.00E-06	5.60E-07	1.50E+00	8.40E-07	2.53E-10	1.51E+01	3.81E-09	8.84E-06
Copper	6.31E+02	6.92E-04	NA		1.94E-05	NA		2.63E-08	NA		
Total Adult Resident				3.4E-06			5.1E-07			6.5E-09	3.9E-06
Total Child Resident				8.0E-06			8.4E-07			3.8E-09	8.8E-06
Total Adult/Child Resident		(89.3% Contribution)		1.1E-05	(10.6% Contribution)		1.4E-06	(0.1% Contribution)		1.0E-08	1.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-280
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-147A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	6.08E+00	6.66E-06	3.00E-04	2.22E-02	9.97E-07	3.00E-04	3.32E-03	1.27E-09	NA		2.55E-02
Copper	6.31E+02	8.64E-04	4.00E-02	2.16E-02	3.45E-05	4.00E-02	8.62E-04	1.31E-07	NA		2.25E-02
Child Resident											
Arsenic	6.08E+00	6.22E-05	3.00E-04	2.07E-01	6.53E-06	3.00E-04	2.18E-02	2.95E-09	NA		2.29E-01
Copper	6.31E+02	8.07E-03	4.00E-02	2.02E-01	2.26E-04	4.00E-02	5.65E-03	3.07E-07	NA		2.07E-01
Total Adult Resident				4.4E-02			4.2E-03			0.0E+00	0.05
Total Child Resident		(93.7% Contribution)		4.1E-01	(6.3% Contribution)		2.7E-02	(0% Contribution)		0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-281
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-187
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	2.80E+00	1.05E-06	1.50E+00	1.58E-06	1.57E-07	1.50E+00	2.36E-07	2.00E-10	1.51E+01	3.01E-09	1.82E-06
Copper	3.24E+02	1.52E-04	NA		6.07E-06	NA		2.31E-08	NA		
Child Resident											
Arsenic	2.80E+00	2.45E-06	1.50E+00	3.68E-06	2.58E-07	1.50E+00	3.87E-07	1.17E-10	1.51E+01	1.75E-09	4.07E-06
Copper	3.24E+02	3.55E-04	NA		9.94E-06	NA		1.35E-08	NA		
Total Adult Resident				1.6E-06			2.4E-07			3.0E-09	1.8E-06
Total Child Resident				3.7E-06			3.9E-07			1.8E-09	4.1E-06
Total Adult/Child Resident		(89.3% Contribution)		5.3E-06	(10.6% Contribution)		6.2E-07	(0.1% Contribution)		4.8E-09	5.9E-06

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-282
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-187
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	2.80E+00	3.07E-06	3.00E-04	1.02E-02	4.59E-07	3.00E-04	1.53E-03	5.83E-10	NA		1.18E-02
Copper	3.24E+02	4.44E-04	4.00E-02	1.11E-02	1.77E-05	4.00E-02	4.43E-04	6.75E-08	NA		1.15E-02
Child Resident											
Arsenic	2.80E+00	2.86E-05	3.00E-04	9.55E-02	3.01E-06	3.00E-04	1.00E-02	1.36E-09	NA		1.05E-01
Copper	3.24E+02	4.14E-03	4.00E-02	1.04E-01	1.16E-04	4.00E-02	2.90E-03	1.57E-07	NA		1.06E-01
Total Adult Resident				2.1E-02			2.0E-03			0.0E+00	0.02
Total Child Resident			(93.9% Contribution)	2.0E-01		(6.1% Contribution)	1.3E-02		(0% Contribution)	0.0E+00	0.2

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-283
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-188B
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.41E+00	1.66E-06	1.50E+00	2.49E-06	2.48E-07	1.50E+00	3.72E-07	3.15E-10	1.51E+01	4.74E-09	2.86E-06
Copper	3.91E+02	1.84E-04	NA		7.33E-06	NA		2.79E-08	NA		
Child Resident											
Arsenic	4.41E+00	3.87E-06	1.50E+00	5.80E-06	4.06E-07	1.50E+00	6.09E-07	1.84E-10	1.51E+01	2.76E-09	6.41E-06
Copper	3.91E+02	4.28E-04	NA		1.20E-05	NA		1.63E-08	NA		
Total Adult Resident				2.5E-06			3.7E-07			4.7E-09	2.9E-06
Total Child Resident				5.8E-06			6.1E-07			2.8E-09	6.4E-06
Total Adult/Child Resident		(89.3% Contribution)		8.3E-06	(10.6% Contribution)		9.8E-07	(0.1% Contribution)		7.5E-09	9.3E-06

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-284
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 22 - Property 101-12-188B
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 22, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.41E+00	4.83E-06	3.00E-04	1.61E-02	7.23E-07	3.00E-04	2.41E-03	9.18E-10	NA		1.85E-02
Copper	3.91E+02	5.36E-04	4.00E-02	1.34E-02	2.14E-05	4.00E-02	5.34E-04	8.14E-08	NA		1.39E-02
Child Resident											
Arsenic	4.41E+00	4.51E-05	3.00E-04	1.50E-01	4.74E-06	3.00E-04	1.58E-02	2.14E-09	NA		1.66E-01
Copper	3.91E+02	5.00E-03	4.00E-02	1.25E-01	1.40E-04	4.00E-02	3.50E-03	1.90E-07	NA		1.28E-01
Total Adult Resident				3.0E-02			2.9E-03			0.0E+00	0.03
Total Child Resident			(93.5% Contribution)	2.8E-01		(6.5% Contribution)	1.9E-02		(0% Contribution)	0.0E+00	0.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-285
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 22
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-136	**Adult Resident**	Arsenic	4.97E+00	2.80E-06	4.19E-07	5.34E-09	3.23E-06	1.82E-02	2.72E-03		2.09E-02
		Copper	3.96E+02					1.36E-02	5.41E-04		1.41E-02
		Total					3.2E-06				0.03
	Child Resident	Arsenic	4.97E+00	6.54E-06	6.86E-07	3.11E-09	7.23E-06	1.69E-01	1.78E-02		1.87E-01
		Copper	3.96E+02					1.27E-01	3.54E-03		1.30E-01
		Total					7.2E-06				0.3
	Adult/Child Resident	Arsenic	4.97E+00	9.34E-06	1.11E-06	8.45E-09	1.05E-05				
		Copper	3.96E+02								
		Total					1.0E-05				NA
101-12-147A	**Adult Resident**	Arsenic	6.08E+00	3.43E-06	5.13E-07	6.53E-09	3.95E-06	2.22E-02	3.32E-03		2.55E-02
		Copper	6.31E+02					2.16E-02	8.62E-04		2.25E-02
		Total					3.9E-06				0.05
	Child Resident	Arsenic	6.08E+00	8.00E-06	8.40E-07	3.81E-09	8.84E-06	2.07E-01	2.18E-02		2.29E-01
		Copper	6.31E+02					2.02E-01	5.65E-03		2.07E-01
		Total					8.8E-06				0.4
	Adult/Child Resident	Arsenic	6.08E+00	1.14E-05	1.35E-06	1.03E-08	1.28E-05				
		Copper	6.31E+02								
		Total					1.3E-05				NA
101-12-187	**Adult Resident**	Arsenic	2.80E+00	1.58E-06	2.36E-07	3.01E-09	1.82E-06	1.02E-02	1.53E-03		1.18E-02
		Copper	3.24E+02					1.11E-02	4.43E-04		1.15E-02
		Total					1.8E-06				0.02
	Child Resident	Arsenic	2.80E+00	3.68E-06	3.87E-07	1.75E-09	4.07E-06	9.55E-02	1.00E-02		1.05E-01
		Copper	3.24E+02					1.04E-01	2.90E-03		1.06E-01
		Total					4.1E-06				0.2
	Adult/Child Resident	Arsenic	2.80E+00	5.26E-06	6.23E-07	4.76E-09	5.89E-06				
		Copper	3.24E+02								
		Total					5.9E-06				NA

Table A-285
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 22
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-12-188B	**Adult Resident**	Arsenic	4.41E+00	2.49E-06	3.72E-07	4.74E-09	2.86E-06	1.61E-02	2.41E-03		1.85E-02
		Copper	3.91E+02					1.34E-02	5.34E-04		1.39E-02
		Total					2.9E-06				0.03
	Child Resident	Arsenic	4.41E+00	5.80E-06	6.09E-07	2.76E-09	6.41E-06	1.50E-01	1.58E-02		1.66E-01
		Copper	3.91E+02					1.25E-01	3.50E-03		1.28E-01
		Total					6.4E-06				0.3
	Adult/Child Resident	Arsenic	4.41E+00	8.28E-06	9.81E-07	7.50E-09	9.27E-06				
		Copper	3.91E+02								
		Total					9.3E-06				NA

Notes:
NA = Not applicable

Table A-286
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 22
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-12-136	1.0E-05	0.3
101-12-147A	1.3E-05	0.4
101-12-187	5.9E-06	0.2
101-12-188B	9.3E-06	0.3

Table A-287
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-193
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 23, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.01E+00	2.26E-06	1.50E+00	3.39E-06	3.38E-07	1.50E+00	5.07E-07	4.29E-10	1.51E+01	6.46E-09	3.90E-06
Copper	6.63E+02	3.11E-04	NA		1.24E-05	NA		4.73E-08	NA		
Child Resident											
Arsenic	6.01E+00	5.27E-06	1.50E+00	7.90E-06	5.53E-07	1.50E+00	8.30E-07	2.50E-10	1.51E+01	3.77E-09	8.74E-06
Copper	6.63E+02	7.27E-04	NA		2.03E-05	NA		2.76E-08	NA		
Total Adult Resident				3.4E-06			5.1E-07			6.5E-09	3.9E-06
Total Child Resident				7.9E-06			8.3E-07			3.8E-09	8.7E-06
Total Adult/Child Resident		(89.3% Contribution)		1.1E-05	(10.6% Contribution)		1.3E-06	(0.1% Contribution)		1.0E-08	1.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-288
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-193
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 23, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.01E+00	6.59E-06	3.00E-04	2.20E-02	9.85E-07	3.00E-04	3.28E-03	1.25E-09	NA		2.52E-02
Copper	6.63E+02	9.08E-04	4.00E-02	2.27E-02	3.62E-05	4.00E-02	9.06E-04	1.38E-07	NA		2.36E-02
Child Resident											
Arsenic	6.01E+00	6.15E-05	3.00E-04	2.05E-01	6.45E-06	3.00E-04	2.15E-02	2.92E-09	NA		2.26E-01
Copper	6.63E+02	8.48E-03	4.00E-02	2.12E-01	2.37E-04	4.00E-02	5.93E-03	3.22E-07	NA		2.18E-01
Total Adult Resident				4.5E-02			4.2E-03			0.0E+00	0.05
Total Child Resident		(93.8% Contribution)		4.2E-01	(6.2% Contribution)		2.7E-02	(0% Contribution)		0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-289
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-234
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 23, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.73E+00	2.53E-06	1.50E+00	3.79E-06	3.78E-07	1.50E+00	5.68E-07	4.80E-10	1.51E+01	7.23E-09	4.37E-06
Copper	2.76E+02	1.30E-04	NA		5.17E-06	NA		1.97E-08	NA		
Child Resident											
Arsenic	6.73E+00	5.90E-06	1.50E+00	8.85E-06	6.20E-07	1.50E+00	9.29E-07	2.80E-10	1.51E+01	4.22E-09	9.78E-06
Copper	2.76E+02	3.02E-04	NA		8.47E-06	NA		1.15E-08	NA		
Total Adult Resident				3.8E-06			5.7E-07			7.2E-09	4.4E-06
Total Child Resident				8.9E-06			9.3E-07			4.2E-09	9.8E-06
Total Adult/Child Resident		(89.3% Contribution)		1.3E-05	(10.6% Contribution)		1.5E-06	(0.1% Contribution)		1.1E-08	1.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-290
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-234
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 23, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.73E+00	7.38E-06	3.00E-04	2.46E-02	1.10E-06	3.00E-04	3.68E-03	1.40E-09	NA		2.8E-02
Copper	2.76E+02	3.78E-04	4.00E-02	9.45E-03	1.51E-05	4.00E-02	3.77E-04	5.75E-08	NA		9.8E-03
Child Resident											
Arsenic	6.73E+00	6.88E-05	3.00E-04	2.29E-01	7.23E-06	3.00E-04	2.41E-02	3.27E-09	NA		2.5E-01
Copper	2.76E+02	3.53E-03	4.00E-02	8.82E-02	9.88E-05	4.00E-02	2.47E-03	1.34E-07	NA		9.1E-02
Total Adult Resident				3.4E-02			4.1E-03			0.0E+00	0.04
Total Child Resident			(92.3% Contribution)	3.2E-01		(7.7% Contribution)	2.7E-02		(0% Contribution)	0.0E+00	0.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-291
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-236
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 23, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	5.41E+00	2.03E-06	1.50E+00	3.05E-06	3.04E-07	1.50E+00	4.56E-07	3.86E-10	1.51E+01	5.81E-09	3.51E-06
Copper	6.43E+02	3.02E-04	NA		1.20E-05	NA		4.59E-08	NA		
Child Resident											
Arsenic	5.41E+00	4.74E-06	1.50E+00	7.11E-06	4.98E-07	1.50E+00	7.47E-07	2.25E-10	1.51E+01	3.39E-09	7.86E-06
Copper	6.43E+02	7.05E-04	NA		1.97E-05	NA		2.68E-08	NA		
Total Adult Resident				3.0E-06			4.6E-07			5.8E-09	3.5E-06
Total Child Resident				7.1E-06			7.5E-07			3.4E-09	7.9E-06
Total Adult/Child Resident		(89.3% Contribution)		1.0E-05	(10.6% Contribution)		1.2E-06	(0.1% Contribution)		9.2E-09	1.1E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-292
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 23 - Property 101-12-236
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 23, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	5.41E+00	5.93E-06	3.00E-04	1.98E-02	8.87E-07	3.00E-04	2.96E-03	1.13E-09	NA		2.3E-02
Copper	6.43E+02	8.81E-04	4.00E-02	2.20E-02	3.51E-05	4.00E-02	8.79E-04	1.34E-07	NA		2.3E-02
Child Resident											
Arsenic	5.41E+00	5.53E-05	3.00E-04	1.84E-01	5.81E-06	3.00E-04	1.94E-02	2.63E-09	NA		2.0E-01
Copper	6.43E+02	8.22E-03	4.00E-02	2.06E-01	2.30E-04	4.00E-02	5.75E-03	3.12E-07	NA		2.1E-01
Total Adult Resident				4.2E-02			3.8E-03			0.0E+00	0.05
Total Child Resident			(93.9% Contribution)	3.9E-01		(6.1% Contribution)	2.5E-02		(0% Contribution)	0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-293
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 23
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-193	**Adult Resident**	Arsenic	6.01E+00	3.39E-06	5.07E-07	6.46E-09	3.90E-06	2.20E-02	3.28E-03		2.52E-02
		Copper	6.63E+02					2.27E-02	9.06E-04		2.36E-02
		Total					3.9E-06				0.05
	Child Resident	Arsenic	6.01E+00	7.90E-06	8.30E-07	3.77E-09	8.74E-06	2.05E-01	2.15E-02		2.26E-01
		Copper	6.63E+02					2.12E-01	5.93E-03		2.18E-01
		Total					8.7E-06				0.4
	Adult/Child Resident	Arsenic	6.01E+00	1.13E-05	1.34E-06	1.02E-08	1.26E-05				
		Copper	6.63E+02								
		Total					1.3E-05				NA
101-12-234	**Adult Resident**	Arsenic	6.73E+00	3.79E-06	5.68E-07	7.23E-09	4.37E-06	2.46E-02	3.68E-03		2.83E-02
		Copper	2.76E+02					9.45E-03	3.77E-04		9.83E-03
		Total					4.4E-06				0.04
	Child Resident	Arsenic	6.73E+00	8.85E-06	9.29E-07	4.22E-09	9.78E-06	2.29E-01	2.41E-02		2.54E-01
		Copper	2.76E+02					8.82E-02	2.47E-03		9.07E-02
		Total					9.8E-06				0.3
	Adult/Child Resident	Arsenic	6.73E+00	1.26E-05	1.50E-06	1.14E-08	1.42E-05				
		Copper	2.76E+02								
		Total					1.4E-05				NA
101-12-236	**Adult Resident**	Arsenic	5.41E+00	3.05E-06	4.56E-07	5.81E-09	3.51E-06	1.98E-02	2.96E-03		2.27E-02
		Copper	6.43E+02					2.20E-02	8.79E-04		2.29E-02
		Total					3.5E-06				0.05
	Child Resident	Arsenic	5.41E+00	7.11E-06	7.47E-07	3.39E-09	7.86E-06	1.84E-01	1.94E-02		2.04E-01
		Copper	6.43E+02					2.06E-01	5.75E-03		2.11E-01
		Total					7.9E-06				0.4
	Adult/Child Resident	Arsenic	5.41E+00	1.02E-05	1.20E-06	9.20E-09	1.14E-05				
		Copper	6.43E+02								
		Total					1.1E-05				NA

Notes:
NA = Not applicable

Table A-294
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 23
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-12-193	1.3E-05	0.4
101-12-234	1.4E-05	0.3
101-12-236	1.1E-05	0.4

Table A-295
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-019
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 24, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.46E+00	1.68E-06	1.50E+00	2.51E-06	2.51E-07	1.50E+00	3.76E-07	3.18E-10	1.51E+01	4.79E-09	2.89E-06
Copper	4.17E+02	1.96E-04	NA		7.81E-06	NA		2.98E-08	NA		
Child Resident											
Arsenic	4.46E+00	3.91E-06	1.50E+00	5.87E-06	4.11E-07	1.50E+00	6.16E-07	1.86E-10	1.51E+01	2.79E-09	6.48E-06
Copper	4.17E+02	4.57E-04	NA		1.28E-05	NA		1.74E-08	NA		
Total Adult Resident				2.5E-06			3.8E-07			4.8E-09	2.9E-06
Total Child Resident				5.9E-06			6.2E-07			2.8E-09	6.5E-06
Total Adult/Child Resident		(89.3% Contribution)		8.4E-06	(10.6% Contribution)		9.9E-07	(0.1% Contribution)		7.6E-09	9.4E-06

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-296
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-019
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 24, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.46E+00	4.89E-06	3.00E-04	1.63E-02	7.31E-07	3.00E-04	2.44E-03	9.29E-10	NA		1.87E-02
Copper	4.17E+02	5.71E-04	4.00E-02	1.43E-02	2.28E-05	4.00E-02	5.70E-04	8.68E-08	NA		1.49E-02
Child Resident											
Arsenic	4.46E+00	4.56E-05	3.00E-04	1.52E-01	4.79E-06	3.00E-04	1.60E-02	2.17E-09	NA		1.68E-01
Copper	4.17E+02	5.33E-03	4.00E-02	1.33E-01	1.49E-04	4.00E-02	3.73E-03	2.03E-07	NA		1.37E-01
Total Adult Resident				3.1E-02			3.0E-03			0.0E+00	0.03
Total Child Resident			(93.5% Contribution)	2.9E-01		(6.5% Contribution)	2.0E-02		(0% Contribution)	0.0E+00	0.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-297
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-023
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 24, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.06E+00	2.28E-06	1.50E+00	3.42E-06	3.41E-07	1.50E+00	5.11E-07	4.33E-10	1.51E+01	6.51E-09	3.93E-06
Copper	5.36E+02	2.52E-04	NA		1.00E-05	NA		3.83E-08	NA		
Child Resident											
Arsenic	6.06E+00	5.31E-06	1.50E+00	7.97E-06	5.58E-07	1.50E+00	8.37E-07	2.52E-10	1.51E+01	3.80E-09	8.81E-06
Copper	5.36E+02	5.87E-04	NA		1.64E-05	NA		2.23E-08	NA		
Total Adult Resident				3.4E-06			5.1E-07			6.5E-09	3.9E-06
Total Child Resident				8.0E-06			8.4E-07			3.8E-09	8.8E-06
Total Adult/Child Resident		(89.3% Contribution)		1.1E-05	(10.6% Contribution)		1.3E-06	(0.1% Contribution)		1.0E-08	1.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-298
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-10-023
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 24, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	6.06E+00	6.64E-06	3.00E-04	2.21E-02	9.94E-07	3.00E-04	3.31E-03	1.26E-09	NA		2.5E-02
Copper	5.36E+02	7.34E-04	4.00E-02	1.84E-02	2.93E-05	4.00E-02	7.32E-04	1.12E-07	NA		1.9E-02
Child Resident											
Arsenic	6.06E+00	6.20E-05	3.00E-04	2.07E-01	6.51E-06	3.00E-04	2.17E-02	2.94E-09	NA		2.3E-01
Copper	5.36E+02	6.85E-03	4.00E-02	1.71E-01	1.92E-04	4.00E-02	4.80E-03	2.60E-07	NA		1.8E-01
Total Adult Resident				4.0E-02			4.0E-03			0.0E+00	0.04
Total Child Resident			(93.4% Contribution)	3.8E-01		(6.6% Contribution)	2.6E-02		(0% Contribution)	0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-299
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-12-241
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 24, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.83E+00	1.81E-06	1.50E+00	2.72E-06	2.72E-07	1.50E+00	4.07E-07	3.45E-10	1.51E+01	5.19E-09	3.13E-06
Copper	3.74E+02	1.76E-04	NA		7.01E-06	NA		2.67E-08	NA		
Child Resident											
Arsenic	4.83E+00	4.23E-06	1.50E+00	6.35E-06	4.45E-07	1.50E+00	6.67E-07	2.01E-10	1.51E+01	3.03E-09	7.02E-06
Copper	3.74E+02	4.10E-04	NA		1.15E-05	NA		1.56E-08	NA		
Total Adult Resident				2.7E-06			4.1E-07			5.2E-09	3.1E-06
Total Child Resident				6.4E-06			6.7E-07			3.0E-09	7.0E-06
Total Adult/Child Resident			(89.3% Contribution)	9.1E-06		(10.6% Contribution)	1.1E-06		(0.1% Contribution)	8.2E-09	1.0E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-300
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 24 - Property 101-12-241
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 24, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Chronic Daily Intake [mg/kg/day]**	**Reference Dose RfD [mg/kg/day]**	**Hazard Quotient [-]**	**Total Hazard Quotient [-]**
Adult Resident											
Arsenic	4.83E+00	5.29E-06	3.00E-04	1.76E-02	7.92E-07	3.00E-04	2.64E-03	1.01E-09	NA		2.0E-02
Copper	3.74E+02	5.12E-04	4.00E-02	1.28E-02	2.04E-05	4.00E-02	5.11E-04	7.79E-08	NA		1.3E-02
Child Resident											
Arsenic	4.83E+00	4.94E-05	3.00E-04	1.65E-01	5.19E-06	3.00E-04	1.73E-02	2.35E-09	NA		1.8E-01
Copper	3.74E+02	4.78E-03	4.00E-02	1.20E-01	1.34E-04	4.00E-02	3.35E-03	1.82E-07	NA		1.2E-01
Total Adult Resident				3.0E-02			3.2E-03			0.0E+00	0.03
Total Child Resident		(93.2% Contribution)		2.8E-01	(6.8% Contribution)		2.1E-02	(0% Contribution)		0.0E+00	0.3

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-301
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 24
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-10-019	**Adult Resident**	Arsenic	4.46E+00	2.51E-06	3.76E-07	4.79E-09	2.89E-06	1.63E-02	2.44E-03		1.87E-02
		Copper	4.17E+02					1.43E-02	5.70E-04		1.49E-02
		Total					2.9E-06				0.03
	Child Resident	Arsenic	4.46E+00	5.87E-06	6.16E-07	2.79E-09	6.48E-06	1.52E-01	1.60E-02		1.68E-01
		Copper	4.17E+02					1.33E-01	3.73E-03		1.37E-01
		Total					6.5E-06				0.3
	Adult/Child Resident	Arsenic	4.46E+00	8.38E-06	9.92E-07	7.59E-09	9.38E-06				
		Copper	4.17E+02								
		Total					9.4E-06				NA
101-10-023	**Adult Resident**	Arsenic	6.06E+00	3.42E-06	5.11E-07	6.51E-09	3.93E-06	2.21E-02	3.31E-03		2.54E-02
		Copper	5.36E+02					1.84E-02	7.32E-04		1.91E-02
		Total					3.9E-06				0.04
	Child Resident	Arsenic	6.06E+00	7.97E-06	8.37E-07	3.80E-09	8.81E-06	2.07E-01	2.17E-02		2.28E-01
		Copper	5.36E+02					1.71E-01	4.80E-03		1.76E-01
		Total					8.8E-06				0.4
	Adult/Child Resident	Arsenic	6.06E+00	1.14E-05	1.35E-06	1.03E-08	1.27E-05				
		Copper	5.36E+02								
		Total					1.3E-05				NA
101-12-241	**Adult Resident**	Arsenic	4.83E+00	2.72E-06	4.07E-07	5.19E-09	3.13E-06	1.76E-02	2.64E-03		2.03E-02
		Copper	3.74E+02					1.28E-02	5.11E-04		1.33E-02
		Total					3.1E-06				0.03
	Child Resident	Arsenic	4.83E+00	6.35E-06	6.67E-07	3.03E-09	7.02E-06	1.65E-01	1.73E-02		1.82E-01
		Copper	3.74E+02					1.20E-01	3.35E-03		1.23E-01
		Total					7.0E-06				0.3
	Adult/Child Resident	Arsenic	4.83E+00	9.07E-06	1.07E-06	8.22E-09	1.02E-05				
		Copper	3.74E+02								
		Total					1.0E-05				NA

Notes:
NA = Not applicable

Table A-302
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 24
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-10-019	9.4E-06	0.3
101-10-023	1.3E-05	0.4
101-12-241	1.0E-05	0.3

Table A-303
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-154A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.68E+00	1.76E-06	1.50E+00	2.64E-06	2.63E-07	1.50E+00	3.95E-07	3.34E-10	1.51E+01	5.03E-09	3.04E-06
Copper	7.80E+02	3.66E-04	NA		1.46E-05	NA		5.57E-08	NA		
Child Resident											
Arsenic	4.68E+00	4.10E-06	1.50E+00	6.15E-06	4.31E-07	1.50E+00	6.46E-07	1.95E-10	1.51E+01	2.93E-09	6.80E-06
Copper	7.80E+02	8.55E-04	NA		2.39E-05	NA		3.25E-08	NA		
Total Adult Resident				2.6E-06			3.9E-07			5.0E-09	3.0E-06
Total Child Resident				6.2E-06			6.5E-07			2.9E-09	6.8E-06
Total Adult/Child Resident		(89.3% Contribution)		8.8E-06	(10.6% Contribution)		1.0E-06	(0.1% Contribution)		8.0E-09	9.8E-06

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-304
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-154A
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	4.68E+00	5.13E-06	3.00E-04	1.71E-02	7.67E-07	3.00E-04	2.56E-03	9.74E-10	NA		1.97E-02
Copper	7.80E+02	1.07E-03	4.00E-02	2.67E-02	4.26E-05	4.00E-02	1.07E-03	1.62E-07	NA		2.78E-02
Child Resident											
Arsenic	4.68E+00	4.79E-05	3.00E-04	1.60E-01	5.03E-06	3.00E-04	1.68E-02	2.27E-09	NA		1.76E-01
Copper	7.80E+02	9.97E-03	4.00E-02	2.49E-01	2.79E-04	4.00E-02	6.98E-03	3.79E-07	NA		2.56E-01
Total Adult Resident				4.4E-02			3.6E-03			0.0E+00	0.05
Total Child Resident			(94.5% Contribution)	4.1E-01		(5.5% Contribution)	2.4E-02		(0% Contribution)	0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-305
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-155
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	4.22E+00	1.59E-06	1.50E+00	2.38E-06	2.37E-07	1.50E+00	3.56E-07	3.01E-10	1.51E+01	4.53E-09	2.74E-06
Copper	7.43E+02	3.49E-04	NA		1.39E-05	NA		5.30E-08	NA		
Child Resident											
Arsenic	4.22E+00	3.70E-06	1.50E+00	5.55E-06	3.88E-07	1.50E+00	5.83E-07	1.76E-10	1.51E+01	2.64E-09	6.13E-06
Copper	7.43E+02	8.14E-04	NA		2.28E-05	NA		3.09E-08	NA		
Total Adult Resident				2.4E-06			3.6E-07			4.5E-09	2.7E-06
Total Child Resident				5.5E-06			5.8E-07			2.6E-09	6.1E-06
Total Adult/Child Resident		(89.3% Contribution)		7.9E-06	(10.6% Contribution)		9.4E-07	(0.1% Contribution)		7.2E-09	8.9E-06

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-306
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-155
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	4.22E+00	4.62E-06	3.00E-04	1.54E-02	6.92E-07	3.00E-04	2.31E-03	8.79E-10	NA		1.77E-02
Copper	7.43E+02	1.02E-03	4.00E-02	2.54E-02	4.06E-05	4.00E-02	1.02E-03	1.55E-07	NA		2.65E-02
Child Resident											
Arsenic	4.22E+00	4.32E-05	3.00E-04	1.44E-01	4.53E-06	3.00E-04	1.51E-02	2.05E-09	NA		1.59E-01
Copper	7.43E+02	9.50E-03	4.00E-02	2.37E-01	2.66E-04	4.00E-02	6.65E-03	3.61E-07	NA		2.44E-01
Total Adult Resident				4.1E-02			3.3E-03			0.0E+00	0.04
Total Child Resident			(94.6% Contribution)	3.8E-01		(5.4% Contribution)	2.2E-02		(0% Contribution)	0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-307
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-204
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.40E+00	2.40E-06	1.50E+00	3.61E-06	3.60E-07	1.50E+00	5.40E-07	4.57E-10	1.51E+01	6.88E-09	4.15E-06
Copper	7.12E+02	3.34E-04	NA		1.33E-05	NA		5.08E-08	NA		
Child Resident											
Arsenic	6.40E+00	5.61E-06	1.50E+00	8.42E-06	5.89E-07	1.50E+00	8.84E-07	2.66E-10	1.51E+01	4.01E-09	9.30E-06
Copper	7.12E+02	7.80E-04	NA		2.18E-05	NA		2.96E-08	NA		
Total Adult Resident				3.6E-06			5.4E-07			6.9E-09	4.2E-06
Total Child Resident				8.4E-06			8.8E-07			4.0E-09	9.3E-06
Total Adult/Child Resident		(89.3% Contribution)		1.2E-05	(10.6% Contribution)		1.4E-06	(0.1% Contribution)		1.1E-08	1.3E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-308
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-204
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	6.40E+00	7.01E-06	3.00E-04	2.34E-02	1.05E-06	3.00E-04	3.50E-03	1.33E-09	NA		2.69E-02
Copper	7.12E+02	9.75E-04	4.00E-02	2.44E-02	3.89E-05	4.00E-02	9.73E-04	1.48E-07	NA		2.54E-02
Child Resident											
Arsenic	6.40E+00	6.55E-05	3.00E-04	2.18E-01	6.87E-06	3.00E-04	2.29E-02	3.11E-09	NA		2.41E-01
Copper	7.12E+02	9.10E-03	4.00E-02	2.28E-01	2.55E-04	4.00E-02	6.37E-03	3.46E-07	NA		2.34E-01
Total Adult Resident				4.8E-02			4.5E-03			0.0E+00	0.05
Total Child Resident			(93.8% Contribution)	4.5E-01		(6.2% Contribution)	2.9E-02		(0% Contribution)	0.0E+00	0.5

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-309
Risk Calculation Worksheet for Surface Soil - Carcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-267
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	**RME Medium EPC Value, Cs [mg/kg]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Chronic Daily Intake [mg/kg/day]**	**Cancer Slope Factor, SF [mg/kg/day]$^{-1}$**	**Cancer Risk [-]**	**Total Cancer Risk [-]**
Adult Resident											
Arsenic	6.78E+00	2.55E-06	1.50E+00	3.82E-06	3.81E-07	1.50E+00	5.72E-07	4.84E-10	1.51E+01	7.28E-09	4.40E-06
Copper	3.67E+02	1.72E-04	NA		6.88E-06	NA		2.62E-08	NA		
Child Resident											
Arsenic	6.78E+00	5.94E-06	1.50E+00	8.92E-06	6.24E-07	1.50E+00	9.36E-07	2.82E-10	1.51E+01	4.25E-09	9.86E-06
Copper	3.67E+02	4.02E-04	NA		1.13E-05	NA		1.53E-08	NA		
Total Adult Resident				3.8E-06			5.7E-07			7.3E-09	4.4E-06
Total Child Resident				8.9E-06			9.4E-07			4.2E-09	9.9E-06
Total Adult/Child Resident		(89.3% Contribution)		1.3E-05	(10.6% Contribution)		1.5E-06	(0.1% Contribution)		1.2E-08	1.4E-05

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-310
Risk Calculation Worksheet for Surface Soil - Noncarcinogenic Effects - Residential Exposure Scenario - Zone 25 - Property 101-12-267
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Exposure Scenario Information		
	Exposure Scenario:	Residential
	Scenario Timeframe:	Chronic
	Exposure Medium:	Surface Soil
	Exposure Point:	OnSite
	Receptor Population:	Adult/Child Resident
	Receptor Age:	Adult/Child

Exposure Scenario/Exposure Area Description

Site Risks
Zone 25, Residential Property

Exposure Parameter	Variable	Adult Value	Child Value	Units
Exposure Frequency	EF	350	350	day/yr
Exposure Duration	ED	24	6	yr
Soil Ingestion Rate	IR	100	200	mg/day
Inhalation Rate (Soil Particulate Inhalation)	InR	20	10	m3/day
Particulate Emission Factor	PEF	1.32E+09	1.32E+09	m3/kg
Skin Surface Area (Soil Contact; 1 event per day)	SA_s	5.70E+03	2.80E+03	cm2/day [soil]
Body Weight	BW	70	15	kg
Averaging Time for carcinogens	ATc	70	70	yr
Averaging Time for noncarcinogens	ATnc	24	6	yr
Conversion Factor (yr to day)	CF_1	2.74E-03	2.74E-03	yrs/day
Conversion Factor (mg to kg)	CF_2	1.00E-06	1.00E-06	kg/mg
Bioavailability Factor for Arsenic	BAF_As	0.8	0.8	unitless
Dermal Absorption Arsenic	ABS_As	0.03	0.03	unitless
Dermal Absorption Copper	ABS_Cu	0.01	0.01	unitless
Adherence Factor	AF	0.07	0.2	mg/cm2

Risk Calculations

		Exposure Route = Oral			Exposure Route = Dermal			Exposure Route = Inhalation			
Chemical of Potential Concern	RME Medium EPC Value, Cs [mg/kg]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Chronic Daily Intake [mg/kg/day]	Reference Dose RfD [mg/kg/day]	Hazard Quotient [-]	Total Hazard Quotient [-]
Adult Resident											
Arsenic	6.78E+00	7.43E-06	3.00E-04	2.48E-02	1.11E-06	3.00E-04	3.71E-03	1.41E-09	NA		2.85E-02
Copper	3.67E+02	5.03E-04	4.00E-02	1.26E-02	2.01E-05	4.00E-02	5.01E-04	7.64E-08	NA		1.31E-02
Child Resident											
Arsenic	6.78E+00	6.93E-05	3.00E-04	2.31E-01	7.28E-06	3.00E-04	2.43E-02	3.29E-09	NA		2.55E-01
Copper	3.67E+02	4.69E-03	4.00E-02	1.17E-01	1.31E-04	4.00E-02	3.28E-03	1.78E-07	NA		1.21E-01
Total Adult Resident				3.7E-02			4.2E-03			0.0E+00	0.04
Total Child Resident			(92.7% Contribution)	3.5E-01		(7.3% Contribution)	2.8E-02		(0% Contribution)	0.0E+00	0.4

Notes:
NA = no data; this toxicity value is not available in the standard U.S. EPA toxicity value databases.
RME = reasonable maximum exposure.
EPC = exposure point concentration.

Table A-311
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk Oral	Carcinogenic Risk Dermal	Carcinogenic Risk Inhalation	Carcinogenic Risk Total	Noncarcinogenic HI Oral	Noncarcinogenic HI Dermal	Noncarcinogenic HI Inhalation	Noncarcinogenic HI Total
101-12-154A	**Adult Resident**	Arsenic	4.68E+00	2.64E-06	3.95E-07	5.03E-09	3.04E-06	1.71E-02	2.56E-03		1.97E-02
		Copper	7.80E+02					2.67E-02	1.07E-03		2.78E-02
		Total					3.0E-06				0.05
	Child Resident	Arsenic	4.68E+00	6.15E-06	6.46E-07	2.93E-09	6.80E-06	1.60E-01	1.68E-02		1.76E-01
		Copper	7.80E+02					2.49E-01	6.98E-03		2.56E-01
		Total					6.8E-06				0.4
	Adult/Child Resident	Arsenic	4.68E+00	8.79E-06	1.04E-06	7.96E-09	9.84E-06				
		Copper	7.80E+02								
		Total					9.8E-06				NA
101-12-155	**Adult Resident**	Arsenic	4.22E+00	2.38E-06	3.56E-07	4.53E-09	2.74E-06	1.54E-02	2.31E-03		1.77E-02
		Copper	7.43E+02					2.54E-02	1.02E-03		2.65E-02
		Total					2.7E-06				0.04
	Child Resident	Arsenic	4.22E+00	5.55E-06	5.83E-07	2.64E-09	6.13E-06	1.44E-01	1.51E-02		1.59E-01
		Copper	7.43E+02					2.37E-01	6.65E-03		2.44E-01
		Total					6.1E-06				0.4
	Adult/Child Resident	Arsenic	4.22E+00	7.93E-06	9.39E-07	7.18E-09	8.87E-06				
		Copper	7.43E+02								
		Total					8.9E-06				NA
101-12-204	**Adult Resident**	Arsenic	6.40E+00	3.61E-06	5.40E-07	6.88E-09	4.15E-06	2.34E-02	3.50E-03		2.69E-02
		Copper	7.12E+02					2.44E-02	9.73E-04		2.54E-02
		Total					4.2E-06				0.1
	Child Resident	Arsenic	6.40E+00	8.42E-06	8.84E-07	4.01E-09	9.30E-06	2.18E-01	2.29E-02		2.41E-01
		Copper	7.12E+02					2.28E-01	6.37E-03		2.34E-01
		Total					9.3E-06				0.5
	Adult/Child Resident	Arsenic	6.40E+00	1.20E-05	1.42E-06	1.09E-08	1.35E-05				
		Copper	7.12E+02								
		Total					1.3E-05				NA

Table A-311
Detailed Summary of Residential Cancer Risks and Noncancer Hazards - Zone 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Receptor	COPC	RME Medium EPC Value (mg/kg)	Carcinogenic Risk				Noncarcinogenic HI			
				Oral	Dermal	Inhalation	Total	Oral	Dermal	Inhalation	Total
101-12-267	**Adult Resident**	Arsenic	6.78E+00	3.82E-06	5.72E-07	7.28E-09	4.40E-06	2.48E-02	3.71E-03		2.85E-02
		Copper	3.67E+02					1.26E-02	5.01E-04		1.31E-02
		Total					4.4E-06				0.04
	Child Resident	Arsenic	6.78E+00	8.92E-06	9.36E-07	4.25E-09	9.86E-06	2.31E-01	2.43E-02		2.55E-01
		Copper	3.67E+02					1.17E-01	3.28E-03		1.21E-01
		Total					9.9E-06				0.4
	Adult/Child Resident	Arsenic	6.78E+00	1.27E-05	1.51E-06	1.15E-08	1.43E-05				
		Copper	3.67E+02								
		Total					1.4E-05				NA

Notes:
NA = Not applicable

Table A-312
Summary of Residential Cancer Risks and Noncancer Hazards - Zone 25
Baseline Human Health Risk Assessment
Asarco LLC Hayden Plant Site, Hayden, Arizona

Property	Adult plus Child Cancer Risks	Child Noncancer Hazards
101-12-154A	9.8E-06	0.4
101-12-155	8.9E-06	0.4
101-12-204	1.3E-05	0.5
101-12-267	1.4E-05	0.4