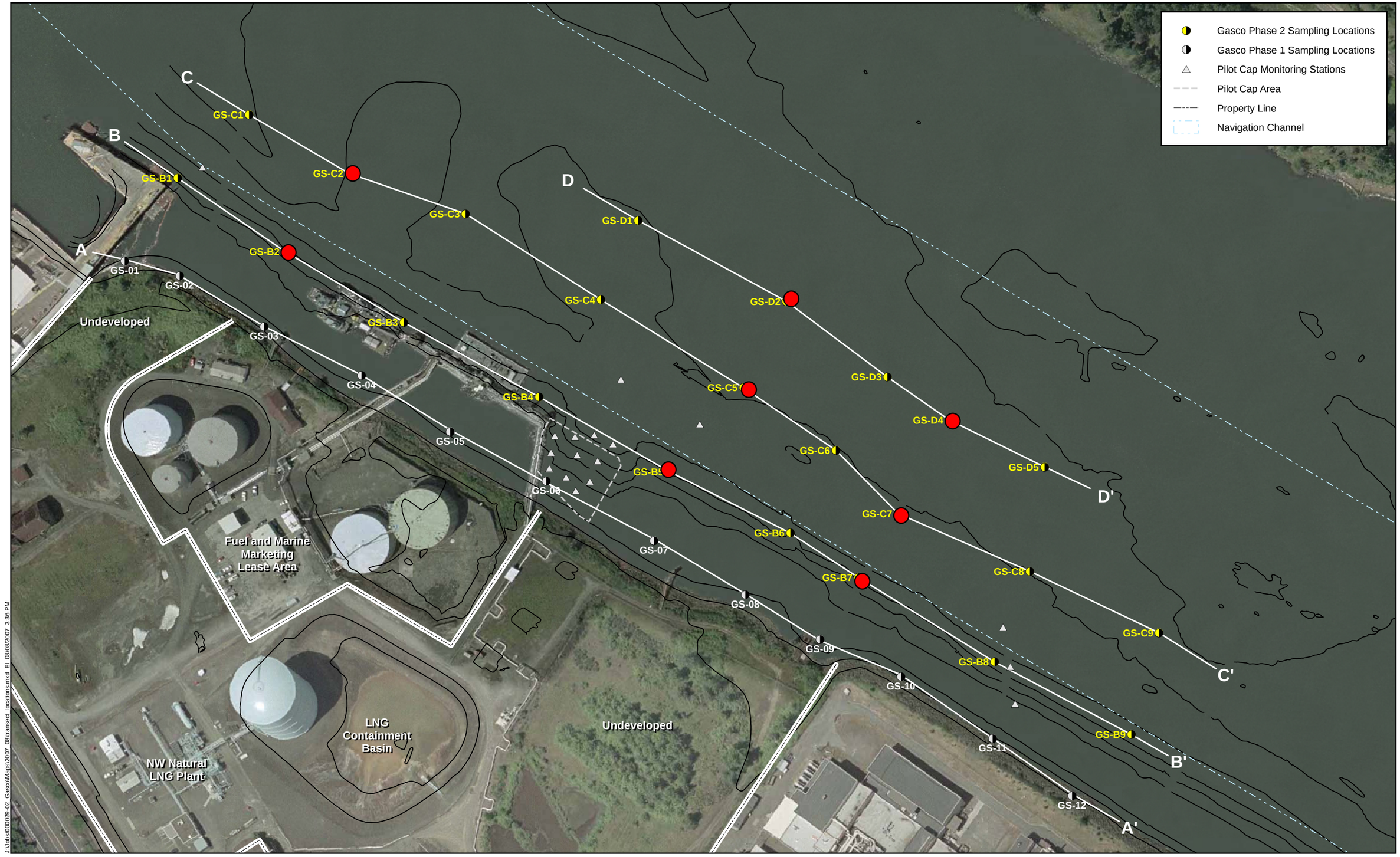

ANCHOR ENVIRONMENTAL, L.L.C.

0 175
Scale in Feet
1 inch equals 175 feet

Proposed Phase 2 Step 2 Boring locations

Figure 11
Proposed Phase 2 Step 2 Boring locations
NW Natural - Gasco Site
Portland, Oregon

ATTACHMENT A

Table 7
Gasco Siltronic Phase 2 Field Sampling Plan Locations, Number of Samples, Depths, and Intervals

Step 1 Reconnaisance Groundwater/Pore Water Sampling			
Site ID	Target Coordinates (NAD 83)		Estimated number of Samples
	Latitude	Longitude	1-2 ft, 5-7 ft, and 13-15 ft
1			3
2			3
3			3
4			3
5			3
6			3
7			3
8			3
9			3
10			3
11			3
12			3
13			3
14			3
15			3
16			3
17			3
18			3
19			3
20			3
21			3
22			3
23			3
# Characterization Samples Analyzed			**69**
5% Field Splits			3
Field Blanks			1
Rinsate Blanks			1
Trip Blanks			1 per container
Estimated Number of Step 1 Samples (not including QC)			**72**

Step 2			Number of Deep Groundwater Samples	Number of Sediment Profile Samples
Site ID	Target Coordinates (NAD 83)		Estimated number of Samples	Estimated number of Samples
	Latitude	Longitude	25 ft, 50 ft, 100 ft, 125 ft, 150 ft, 175 ft	1-2 ft, 5-7 ft, and 8-10 ft
1			6	3
2			6	3
3			6	3
4			6	3
5			6	3
6			6	3
7			6	3
8			6	3
# Characterization Samples Analyzed			**48**	**24**
5% Field Splits			2	
Field Blanks			1	
Rinsate Blanks			1	
Trip Blanks			1 per container	
Estimated Number of Step 2 Samples (not including QC)				**74**

Notes:
1. Sampling stations and depths are proposed and may be revised based on conditions encountered in
2. 175' is the assumed depth to bedrock. Borings will extend until sample refusal occurs.

Table 8
Parameter List, Containers, and Guidelines for Sample Handling and Storage

Parameter	Container Size and Type	Holding Time	Preservative
Reconnaissance Groundwater, Pore Water, and Deep Groundwater Sampling			
Step 1 and Step 2			
VOCs	two 40 ml VOA vials	14 days	HCL ph<2, Cool/4°C
Free Cyanide	500 ml HDPE*	48 hours	NaOH pH>12
Total Cyanide	500 ml HDPE*	14 days	NaOH pH>12
Amenable Cyanide	500 ml HDPE*	14 days	NaOH pH>12
Total PAHs	1 Liter Amber Glass*	7 days until extraction 40 days after extraction	Cool/4°C
Ammonia	250 ml HDPE*	28 days	H2SO4 ph<2, Cool/4°C
Total Metals	250 ml HDPE*	6 months except Hg (28 days)	HNO3, ph<2
Dissolved Metals (field filtered)	250 ml HDPE*	6 months except Hg (28 days)	HNO3, ph<2
Sediment Profiling			
Moisture Content	16-oz WM HDPE (Moisture, Atterberg, Spec Gravity combined)	na	Sealed Jar
Grain Size (with hydrometer)	16-oz WM HDPE	na	na
Total Organic Carbon (%)	4-oz Glass	28 days	na
VOCs	40 mL VOC Vials and Easy Draw Sampler	14 days	Sodium Bisulfite or Methanol Cool/4° C
PAHs	8-oz Glass	14 days until extraction	Cool/4° C
		1 year until extraction 40 days after extraction	Freeze
Total Cyanide	8-oz Glass (CN, NH4, Metals combined)	14 days	Cool/4° C
Total Metals		6 months except Hg (28 days)	Cool/4° C
Ammonia as Nitrogen	8-oz Glass (CN, NH4, Metals combined)	7 days	Cool/4°C
Sulfides	2- oz Glass	7 days	Zn acetate, Cool/4° C

Note:

* See Table 9 for exact volume requirements. The smallest possible container meeting these material requirements will be supplied by the laboratory.

Table 9a
Sediment Profiling
Chemical Analytes, Analysis Methods, Reporting and Detection Limits, and Minimum Mass Requirements

Analyte	Preparation Method	Analytical Method	Method Reporting Limit	Method Detection Limit	Minimum Mass needed (g)
Conventionals			**mg/kg**	**mg/kg**	
Moisture Content	---	ASTM D-2216	---	---	**10**
Grain Size with hydrometer	---	ASTM D-421/422	---	---	**300**
Sulfides	Method	9030M	0.5	0.08	**10**
Ammonia as Nitrogen	350.1M	Plumb	0.5	0.2	**20**
Total Organic Carbon (%)	Method	PSEP	0.05	0.02	**5**
Chemical					
VOCs	**5030A**	**8260B**	**ug/kg**	**ug/kg**	**20**
Acetone	---	---	10	1.6	---
Acrolein	---	---	2.5	0.51	---
Acrylonitrile	---	---	2	0.23	---
Benzene	---	---	1	0.039	---
Bromochloromethane	---	---	1	0.06	---
Bromodichloromethane	---	---	1	0.068	---
Bromoform	---	---	1	0.046	---
Bromoethane	---	---	1	0.072	---
Bromomethane	---	---	1	0.37	---
2-Butanone	---	---	4	1.1	---
Carbon Disulfide	---	---	1	0.13	---
Carbon Tetrachloride	---	---	1	0.099	---
Chlorbenzene	---	---	1	0.07	---
Chlorodibromomethane	---	---	1	0.068	---
Chlorethane	---	---	1	0.28	---
2-Chloroethyl Vinyl Ether	---	---	2	0.15	---
Chloroform	---	---	1	0.056	---
Chloromethane	---	---	1	0.19	---
trans-1,4-Dichloro-2-butene	---	---	2	0.51	---
Dibromomethane	---	---	1	0.082	---
1,4-Dichlorobenzene	---	---	1	0.12	---
1,1-Dichloroethane	---	---	1	0.057	---
1,2-Dichloroethane	---	---	1	0.031	---
1,1-Dichloroethene	---	---	1	0.082	---
trans-1,2-Dichloroethene	---	---	1	0.19	---
1,2-Dichloropropane	---	---	1	0.035	---
cis-1,3-Dichloropropene	---	---	1	0.031	---
trans-1,3-Dichloropropene	---	---	1	0.044	---
Dichlorodifluoromethane	---	---	1	0.11	---
Ethylbenzene	---	---	1	0.071	---
2-Hexanone	---	---	2	0.64	---
Idomethane	---	---	2	0.67	---
Isopropylbenzene	---	---	1	0.044	---
4-Methyl-2-Pentanone	---	---	2	0.24	---
Methylene chloride	---	---	5	0.29	---
Methyl tert-butyl ether	---	---	1	0.039	---
Napthalene	---	---	1	0.35	---
Styrene	---	---	1	0.074	---
1,1,1,2-Tetrachloroethane	---	---	1	0.031	---
1,1,2,2-Tetrachloroethane	---	---	1	0.096	---
Tetrachloroethene	---	---	1	0.096	---
Toluene	---	---	1	0.15	---
1,1,1-Trichloroethane	---	---	1	0.059	---
1,1,2-Trichloroethane	---	---	1	0.059	---
Trichloroethene	---	---	1	0.062	---
Trichlorofluoromethane	---	---	1	0.081	---
1,2,3-Trichloropropane	---	---	1	0.11	---

Table 9a
Sediment Profiling
Chemical Analytes, Analysis Methods, Reporting and Detection Limits, and Minimum Mass Requirements

Analyte	Preparation Method	Analytical Method	Method Reporting Limit	Method Detection Limit	Minimum Mass needed (g)
Vinyl Acetate	---	---	1	0.36	---
Vinyle Chloride	---	---	1	0.085	---
m,p-Xylene	---	---	1	0.13	---
o-Xylene	---	---	1	0.075	---
Hexachlorobutadiene	---	---	2	0.17	---
1,2-Dibromoethane (EDB)	---	---	1	0.051	---
PAHs	**EPA 3541**	**EPA 8270C-SIM**	**ug/Kg**	**ug/Kg**	**50**
Acenaphthene	---	---	5	0.16	---
Acenaphthylene	---	---	5	0.22	---
Anthracene	---	---	5	0.22	---
Benzo(a)anthracene	---	---	5	0.16	---
Benzo(b)fluoranthene	---	---	5	0.48	---
Benzo(k)fluoranthene	---	---	5	0.33	---
Benzo(g,h,i)perylene	---	---	5	0.23	---
Benzo(a)pyrene	---	---	5	0.22	---
Chrysene	---	---	5	0.41	---
Dibenz(a,h)anthracene	---	---	5	0.26	---
Fluoranthene	---	---	5	0.34	---
Fluorene	---	---	5	0.19	---
Ideno(1,2,3-cd)pyrene	---	---	5	0.24	---
2-Methylnaphthalene	---	---	5	0.34	---
Naphthalene	---	---	5	0.34	---
Phenanthrene	---	---	5	0.33	---
Pyrene	---	---	5	0.36	---
Total Cyanide	**9010A**	**9012A**	**0.1 mg/Kg**	**0.03 mg/Kg**	**25**
Metals	---	---	**mg/Kg**	**mg/Kg**	**20**
Aluminum	3050B	6020	2	2	---
Antimony	3050B	6020	0.05	0.02	---
Arsenic	3050B	6020	0.5	0.07	---
Barium	3050B	6020	0.05	0.03	---
Beryllium	3050B	6020	0.02	0.006	---
Cadmium	3050B	6020	0.05	0.007	---
Calcium	3050B	6010B	10	3	---
Chromium	3050B	6020	0.2	0.04	---
Copper	3050B	6020	0.1	0.02	---
Iron	3050B	6010B	4	3	---
Lead	3050B	6020	0.05	0.02	---
Magnesium	3050B	6010B	4	2	---
Manganese	3050B	6010B	1	0.3	---
Mercury	7471A	7471A	0.02	0.008	**5**
Nickel	3050B	6020	0.2	0.04	---
Potassium	3050B	6010B	400	300	---
Selenium	7742/SM3114B	7742	0.1	0.02	---
Silver	3050B	6020	0.02	0.003	---
Sodium	3050B	6010B	20	10	---
Thallium	3050B	6020	0.02	0.002	---
Zinc	3050B	6020	0.5	0.2	---
Minimum Mass Needed (Step 2)					**465**

Table 9b
Reconnaissance Groundwater/Pore Water and Deep Groundwater
Analytes, Analysis Methods, Reporting and Detection Limits, and Minimum Mass Requirements

Analyte	Preparation Method	Analytical Method	Method Reporting Limit	Method Detection Limit	Minimum Volume needed (ml)
VOCs (Unfiltered)	**5030B**	**8260B**	**ug/L**	**ug/L**	**80**
Acetone	---	---	20	4.08	---
Acrolein	---	---	20	1.42	---
Acrylonitrile	---	---	5	0.531	---
Benzene	---	---	0.5	0.136	---
Bromochloromethane	---	---	0.5	0.164	---
Bromodichloromethane	---	---	0.5	0.109	---
Bromoform	---	---	0.5	0.279	---
Bromomethane	---	---	0.5	0.217	---
2-Butanone	---	---	20	1.94	---
Carbon Disulfide	---	---	0.5	0.159	---
Carbon Tetrachloride	---	---	0.5	0.139	---
Chlorbenzene	---	---	0.5	0.134	---
Chlorodibromomethane	---	---	0.5	0.104	---
Chlorethane	---	---	0.5	0.226	---
2-Chloroethyl Vinyl Ether	---	---	5	0.333	---
Chloroform	---	---	0.5	0.136	---
Chloromethane	---	---	0.5	0.136	---
trans-1,4-Dichloro-2-butene	---	---	10	0.597	---
1,2-Dibromoethane	---	---	2	0.0981	---
Dibromomethane	---	---	0.5	0.119	---
1,2-Dichlorobenzene	---	---	0.5	0.111	---
1,3-Dichlorobenzene	---	---	0.5	0.102	---
1,4-Dichlorobenzene	---	---	0.5	0.114	---
1,1-Dichloroethane	---	---	0.5	0.101	---
1,2-Dichloroethane	---	---	0.5	0.114	---
1,1-Dichloroethene	---	---	0.5	0.122	---
trans-1,2-Dichloroethene	---	---	0.5	0.143	---
1,2-Dichloropropane	---	---	0.5	0.139	---
cis-1,3-Dichloropropene	---	---	0.5	0.11	---
trans-1,3-Dichloropropene	---	---	0.5	0.0894	---
Dichlorodifluoromethane	---	---	0.5	0.166	---
Ethylbenzene	---	---	0.5	0.13	---
Hexachlorobutadiene	---	---	2	0.28	---
2-Hexanone	---	---	20	3.96	---
Idomethane	---	---	5	0.375	---
Isopropylbenzene	---	---	2	0.105	---
4-Methyl-2-Pentanone	---	---	20	2.7	---
Methylene chloride	---	---	2	0.193	---
Methyl tert-butyl ether	---	---	0.5	0.197	---
Napthalene	---	---	2	0.285	---
Styrene	---	---	0.5	0.0943	---
1,1,1,2-Tetrachloroethane	---	---	0.5	0.111	---
1,1,2,2-Tetrachloroethane	---	---	0.5	0.138	---
Tetrachloroethene	---	---	0.5	0.126	---
Toluene	---	---	0.5	0.108	---
1,2,4-Trichlorobenzene	---	---	2	0.218	---
1,1,1-Trichloroethane	---	---	0.5	0.116	---
1,1,2-Trichloroethane	---	---	0.5	0.138	---
Trichloroethene	---	---	0.5	0.133	---
Trichlorofluoromethane	---	---	0.5	0.131	---
1,2,3-Trichloropropane	---	---	0.5	0.213	---
Vinyl Acetate	---	---	5	0.663	---
Vinyle Chloride	---	---	0.5	0.042	---
m,p-Xylene	---	---	0.5	0.219	---
o-Xylene	---	---	0.5	0.102	---

Table 9b
Reconnaissance Groundwater/Pore Water and Deep Groundwater
Analytes, Analysis Methods, Reporting and Detection Limits, and Minimum Mass Requirements

Analyte	Preparation Method	Analytical Method	Method Reporting Limit	Method Detection Limit	Minimum Volume needed (ml)
Total PAHs (Unfiltered)	**EPA 3520C**	**EPA 8270C**	**ug/L**	**ug/L**	**500***
Acenaphthene	---	---	0.02	0.00198	---
Acenaphthylene	---	---	0.02	0.00178	---
Anthracene	---	---	0.02	0.00103	---
Benzo(a)anthracene	---	---	0.02	0.00210	---
Benzo(b)fluoranthene	---	---	0.02	0.00158	---
Benzo(k)fluoranthene	---	---	0.02	0.00194	---
Benzo(g,h,i)perylene	---	---	0.02	0.00182	---
Benzo(a)pyrene	---	---	0.02	0.00158	---
Chrysene	---	---	0.02	0.00124	---
Dibenz(a,h)anthracene	---	---	0.02	0.00162	---
Dibenzofuran	---	---	0.02	0.00380	---
Fluoranthene	---	---	0.02	0.00238	---
Fluorene	---	---	0.02	0.00258	---
Ideno(1,2,3-cd)pyrene	---	---	0.02	0.00208	---
2-Methylnaphthalene	---	---	0.02	0.00268	---
Naphthalene	---	---	0.02	0.00316	---
Phenanthrene	---	---	0.02	0.00320	---
Pyrene	---	---	0.02	0.00222	---
Free Cyanide (Unfiltered)	**ASTM D-4282-02**	**ASTM D-4282-02**	**10 ug/L**	**3 ug/L**	**50**
Total Cyanide (Unfiltered)	**335.4**	**335.4**	**10 ug/L**	**3 ug/L**	**50**
Amenable Cyanide (Unfiltered)	**NA**	**335.1**	**10 ug/L**	**3 ug/L**	**50**
Total Metals (Unfiltered)	---	---	**ug/L**	**ug/L**	**125**
Aluminum	CLP	6020	2	0.7000	---
Antimony	CLP	6020	0.05	0.0200	---
Arsenic	CLP	6020	0.5	0.2000	---
Barium	CLP	6020	0.05	0.0300	---
Beryllium	CLP	6020	0.02	0.0070	---
Cadmium	CLP	6020	0.02	0.2000	---
Calcium	CLP	6010B	50	20.0000	---
Chromium	CLP	6020	0.2	0.0600	---
Copper	CLP	6020	0.1	0.0300	---
Iron	CLP	6010B	20	20.0000	---
Lead	CLP	6020	0.02	0.0090	---
Magnesium	CLP	6010B	20	9.0000	---
Manganese	CLP	6010B	5	2.0000	---
Mercury	7470A	7470A	0.2	0.0400	**25**
Nickel	CLP	6020	0.2	0.0600	---
Potassium	CLP	6010B	2000	700.0000	---
Selenium	CLP	6020	1	0.2000	---
Silver	CLP	6020	0.02	0.0090	---
Sodium	CLP	6010B	100	60.0000	---
Thallium	CLP	6020	0.2	0.0040	---
Zinc	CLP	6020	0.5	0.3000	__
Ammonia	**NA**	**350.1**	**0.05**	**0.0200**	**10**
Minimum Volume Needed					**890**

Note:

* PAH MRLs/MDLs adjusted 4X due to smaller sample size