

Summary of Fish Tissue Sampling and Analysis, United Heckathorn Superfund Site, Richmond, California, May – June 2008

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Introduction

This technical memorandum (TM) summarizes the fish collection activities and analytical results from the processing of fish tissue samples collected from the Lauritzen Channel, Richmond Inner Harbor, Santa Fe Channel, and Parr Canal in May and June 2008. Sampling was conducted in accordance with the procedures described in the *Focused Feasibility Study Sampling and Analysis Plan for the United Heckathorn Superfund Site Data Gaps Investigation* (CH2M HILL, 2007) and the *Focused Feasibility Study Data Gaps Sampling and Analysis Plan Addendum, United Heckathorn Superfund Site* (CH2M HILL, 2008b), unless otherwise noted in this TM.

Fish were collected using trawling methods at five stations on May 14 and 15, 2008, and using hook and line methods from two stations on June 12, 2008.

Background

The United Heckathorn Superfund Site (the Site) is located in Richmond, California on the east side of San Francisco Bay in Contra Costa County. The Site is situated in an industrial area with active petroleum and shipping terminals. The Site is comprised of two areas: an upland area, which is the former United Heckathorn facility site, and the marine area, which includes the Lauritzen Channel and the Parr Canal. Two commercial enterprises currently operate in the Lauritzen Channel. Manson Construction Company maintains a fleet of tugboats, barges, and dredges along the western portion of the Channel, and shallow draft barges in the northern reach. Levin Richmond Terminal Company (LRTC) conducts shipping operations along the eastern (Berth A and B) pier portion of the Channel. The Lauritzen Channel is an active waterway, with continuous operations occurring around the clock.

EPA issued a Record of Decision (ROD) in 1994, selecting dredging as the primary remedy for the marine area (USEPA1994). Between August 1996 and 1997, approximately 107,945

cubic yards of sediment were removed from the Lauritzen Channel and the Parr Canal. The sediment was disposed of offsite at designated disposal facilities. Clean sand was placed to an average depth of 6 inches over dredged portions of the Lauritzen Channel and placed to an average depth of 18 inches throughout the Parr Canal (Chemical Waste Management, Inc., 1997).

A separate series of sediment investigations were conducted because DDT concentrations in four sediment samples collected within the Lauritzen Channel in 1998 exceeded the ROD remedial average goal of 590 micrograms per kilogram ($\mu\text{g}/\text{kg}$) (Battelle, 2000b). In 1999, a sediment recontamination investigation was implemented (Battelle, 2001b). The results of this investigation triggered Phase I and Phase II Source Investigations (Battelle, 2002b; 2003; 2004). These investigations focused on DDT and dieldrin concentrations along the eastern embankment adjacent to the former United Heckathorn facility, as potential sources of recontamination to sediment within the Lauritzen Channel.

The Post-Remediation Biomonitoring Program (Battelle, 2000a) from 1998 through 2003 (Battelle, 2000a; 2000b; 2001a; 2002a; 2004) included several monitoring elements. The biomonitoring studies focused on collection and analyses of mussel tissue and surface water samples at four monitoring stations located in the Lauritzen, Santa Fe, and Richmond Inner Harbor Channels. In the Year 5 Post-Remediation Biomonitoring event, surface water and mussel tissue samples were also collected from locations within the Parr Canal.

In 2004, the U.S. Army Corps of Engineers (USACE) investigated whether a fluid mud layer exists within the Lauritzen Channel. This investigation incorporated bathymetric and density surveys and a few water quality samples (Odom, 2004; USACE, 2004; 2005).

No comprehensive analysis of fish tissue, in support of the 1994 ROD, has been conducted since the Human Health and Ecological Risk Assessments in 1994 (ICF, 1994: USEPA: 1994). A study evaluating the dredging success by comparing body burdens of pre-dredged biota vs. post-dredged biota found significant levels of DDT remained in fish up to 16 months post-remedial dredging (Weston et al., 2002). This study also suggests that even migratory fish accumulate DDT relatively quickly and that only a few months of residency will increase the body burden of DDT.

Overall, the post-remediation monitoring for the Lauritzen Channel suggests that the remediation goals as defined in the 1994 ROD have not been maintained. USEPA contracted CH2M HILL to prepare a focused feasibility study (FFS) to develop a remedy that is protective of the human health and the environment. This sampling event is part of the data gap investigations for the purpose of the FFS development.

Objectives

The specific objectives of the Data Gaps Investigation fish sampling activities were to determine DDT and dieldrin concentrations in fish tissues in areas within the Richmond Inner Harbor Channel and in proximity to the United Heckathorn Superfund Site to supplement historical post-remediation data and to further characterize current conditions and potential relationships between sediment, water and biota concentrations.

Sample Collection

Fish sampling was conducted in two separate field events during May and July 2008. The following sections describe the field activities and present the analytical results for fish tissue samples. All fish sampling field activities mobilized from the Marina Bay Yacht Harbor at 1360 Marina Way South, Richmond, California. An overview of the project area is shown in Figure 1.

The fish sample collection report, including the number of individual specimen collected at each location and the total number of samples submitted to the laboratory from each location is reported in Table 1.

Fish Tissue Sampling

1. The first round of fish tissue samples were collected by bottom trawling from a total of five locations on May 14 and 15, 2008. The field team for fish collection included the following personnel: Tamara Frank and Erin Kelly of E2/CH2M HILL; Julia Spahn of CH2M HILL; and Andy Lincoff, Amy Wagner and Peter Husby of the USEPA Region 9 Laboratory. The team mobilized from the Marina Harbor Slip after conducting a Health & Safety tailgate meeting and reviewing health and safety procedures.
2. Trawling was conducted by towing a bottom trawl at speeds of between 2 and 4 knots along previously defined trawl lines as defined in the United Heckathorn Sampling and Analyses Plan (SAP) Addendum (CH2M HILL, 2008b); see Figure 2. When possible, trawl lines were centered on the historic mussel collection stations. Figure 3 presents a subset of actual trawl lines run during the sampling event. Not all trawl lines were collected using the GPS but areas not shown by actual GPS data are shown as estimated to depict the areas covered by the sample collection event.
3. Daily high tides during fishing activities occurred at 8:50 AM on May 14, 10:00 AM on May 15, and 12:36 PM on July 15.
4. Fish were removed from the trawl nets by emptying the cod end into a station-specific plastic container. Fish caught in the net were removed with gloved hands and placed in the container. Debris was removed and separated by hand from fish samples and if necessary, fish were rinsed with station seawater to remove mud and/or algae. Fish were inspected for any morphological abnormalities and separated into species-specific groups. Fish were measured and photographed on board, transferred to pre-labeled ziplock-type bags and placed in ice chests. At the end of each day, fish were transported to the Region 9 laboratory, where they were stored frozen until the sampling was complete. At that time, fish from each station were grouped by species and weighed. The fish were subsampled to maximize the number of replicates from each station, using the guidelines of the SAP Addendum (CH2M HILL, 2008b).

Table 1. Fish Sample Collection Table

Species	Inner Richmond Harbor Location 303.1		Laruitzen Channel South Location 303.2		Laruitzen Channel North Location 303.3		Sante Fe Channel Location 303.4		Parr Canal Location 303.6	
	# Specimen	# Samples	# Specimen	# Samples	# Specimen	# Samples	# Specimen	# Samples	# Specimen	# Samples
Shiner Surfperch	9	8			7	5	3	3		
Bay Shrimp	43	2	33	2			96	5		
Anchovy	347	4	19	3	171	3				
Staghorn Sculpin	5	2	2	1	9	4	2	1	26	7
Starry Flounder	2	4 *			6	2	8	7		
Walleyed Perch									41	4
Sanddab	4	1					6	3		
California Halibut	2	4 *								
Bay Goby			18 goby + 1 flounder	1	20	1	34	1		
Jacksmelt					5	10 *	6	12 *		

* Includes fillet and carcass

specimen - number of collected fish

samples - number of fish analyzed

5. On May 14, 2008, Station 303.1, Richmond Inner Harbor, was initially trawled in an east/west transect, approximately 50 meters seaward of the piling station associated with the previous mussel sample collection. It was determined that this trawl line was over a previously dredged channel, since the catch was very limited and no bottom vegetation was collected. Five trawls were completed. The station was occupied from 9:30 to 11:00 AM, on a falling tide. The speed of the trawl was varied to try to maximize the catch. The trawls were 4-8 minutes long with the depth ranging from 4-6 feet. The catch (and range of sizes collected) from Station 303.1 included the following species:
 - 335 anchovy (1" - 2")
 - 2 starry flounder (1.6" - 2.1") (not analyzed due to insufficient mass)
 - 2 bay shrimp (1.5")
 - 1 sculpin (2.7")
 - 5 shiner surfperch (3.5" - 5.5")
 - 1 skate - released
6. Six trawls were completed in the Lauritzen Channel, Station 303.3, on May 14, 2008. Trawling was performed between 12:55 PM and 14:50 PM, on a falling tide. Tugboats were observed operating in the channel immediately before trawling began. Individual trawls were run for approximately 5 - 10 minutes, and extended the length of the channel, centered at historic biomonitoring Station 303.3. The depth of the trawl equipment varied from 2' below the water surface near the northern extent of the channel to approximately 37' at the southern end. One trawl was terminated when the net became caught on what was believed to be a submerged piling. The net was freed by reversing direction of the boat in order to successfully free the netting fabric. A large amount of debris was retrieved in the net during trawling operations within the Lauritzen Channel, including a 5-gallon bucket, a large wooden log, as well as various sized plastic bags, bottles and cans. Trawls were completed in both northerly and southerly directions, with no observable difference in fish recovery. The catch (and range of sizes collected) from Station 303.3 included the following species:
 - 6 starry flounder (2" - 4")
 - 171 anchovy (1" - 2")
 - 2 bay shrimp (1.5") (not analyzed due to insufficient mass)
 - 20 bay goby (1.25" - 2.5")
 - 9 sculpin (2.5" - 5")
 - 7 shiner surfperch (3.75" - 5")
7. Station 303.6 (Parr Canal) was sampled on May 15, 2008, between 9:50 AM and 10:50 AM at a slack high tide. Due to the shallow nature of the Parr Canal, the proposed trawl lines were located in the Santa Fe Channel, centered on the Parr Canal. The sampling team arrived at the location at high tide and traversed the Canal safely. It was decided to conduct the trawl down the center of the Canal. Four trawls were run from the head of the canal to the mouth of the canal, with depths ranging from 2' to 20'. One trawl was discarded after being caught on debris. All trawls were approximately 5 minutes long and each recovery contained a large quantity of green algae. Some debris and bycatch were recovered in the second trawl, including beer

cans and shore crabs. The catch (and range of sizes collected) from Station 303.6 included the following species:

- 26 sculpin (3" - 5.5")
- 41 walleyed perch (1.5" - 3.4")
- 2 anchovy (1" - 1.5") (not analyzed because of insufficient mass)

8. A series of 3 trawls were conducted outside the Parr Canal in the Santa Fe Channel at depths of 30' to 38' of water on May 15, 2008 between 11:15 AM and 12:15 PM on a falling tide. The trawl line ran from the pier extension outside the Parr Canal, southward to the beginning of the cargo pier next to the old Ford plant. All available trawl line was deployed, plus an additional 100' of line was added to the bridle to increase the recovery of the trawl. The trawl was also towed at an increased speed, approximately 4-5 knots. The catch (and range of sizes collected) from Station 303.2 included the following species:

- 2 sculpin (3.5" and 4")
- 33 bay shrimp (1.5" - 3.9")
- 1 sanddab (3.5") (not analyzed because of insufficient mass)
- 18 goby (1.25" - 2")
- 1 starry flounder (2.5")
- 19 anchovy (2.5" - 3.5")

9. Station 303.4 was trawled between 11:50 AM and 12:30 PM on May 14 on a falling tide. The trawl was conducted between the free anchorage outside the Bay Marine dry dock facilities to the southwest end of the floating dock which contained Biomonitoring Station 303.4. The only catch in the three attempted trawls included 18 shrimp. Due to the low recovery of specimens in the first series of trawls at Station 303.4, a second round of trawls was conducted on May 15, 2008 from 13:45 PM to 14:20 PM on a falling tide. The towing speed was increased in an attempt to catch fish that may be escaping the net. The depth of the trawl equipment was 32' to 36' below the water surface. Three trawls were run with better recoveries than the previous attempt. The catch (and range of sizes collected) from Station 303.4 included the following species:

- 96 bay shrimp (1.5" - 2.5")
- 3 shiner surfperch (4.5" - 6")
- 2 sculpin (3" and 5")
- 8 starry flounder (4" - 6")
- 6 sanddab (2.5" - 4.5")
- 34 goby (1" - 1.5")

10. Since the increased speed provided a better catch at Station 303.4, Station 303.1 was revisited in an attempt to increase the catch at this important background location. The station was also moved slightly south to sample in a more biologically active (not recently dredged) site. Three trawls were completed with a significantly better catch. The catch (and range of sizes collected) from subsequent samplings at Station 303.1 included the following species:

- 2 California halibut (11" and 12")
 - 4 shiner surfperch (4.5" - 6")
 - 41 bay shrimp (1.5" - 2")
 - 2 walleyed perch (1.5") (not analyzed because of insufficient mass)
 - 2 starry flounder (8" and 14.5")
 - 5 sculpin (4" - 4.5")
 - 4 sanddab (2.5" - 3.5")
 - 12 anchovy (1" - 2")
11. One of the target species, white croaker, was not represented in the trawling catches. It is a species that is typically caught by fishers using hook and line around piers and pilings, so two of the locations with piers (Station 303.3 - Lauritzen Channel and the floating dock at Station 303.4) were sampled by angling on June 12, 2008. A variety of fishing techniques were employed, including jigging with crappie rigs; fishing with light tackle baited with pile worms, mussels, or anchovies; and throw nets. The only species collected were jacksmelt. Six smelt (8" to 12") were collected at Station 303.3 and five smelt (7.75" to 10") were collected at Station 303.4. One leopard shark was caught and released at Station 303.4.
 12. All samples were catalogued, photographed, transferred to a labeled ziplock-type bag and placed on ice in an onboard ice chest for transport back to the laboratory.
 13. At the conclusion of each round of sampling the fish were grouped into samples for the laboratory that would provide the maximum number of samples with sufficient mass (determined to be 15 g) for analysis. Each station samples were thawed, separated into species groups and weighed. If individual fish weighed at least 15 g, the fish was submitted as an individual. If it was necessary to composite multiple fish due to the small size of individual samples, fish of similar length were grouped together to make a sample. If fish were large enough to provide sufficient mass after filleting (typically greater than 7") the fish were filleted and the carcass and fillet (skin on, with belly flat) were packaged separately for the laboratory. Filleting was performed using disposable scalpels and Teflon protectors on the cutting board.
 14. At the conclusion of the sampling event, fish from each location were compiled and weighed and the length measured. A target goal of 20 grams for each sample was applied to sample preparation. Fish from the same species and of similar size were composited to achieve the goal of 20 grams. If the fish were of sufficient size (approximately 10 inches or greater) the specimens were filleted and the fillet and carcass weighed and submitted to the laboratory individually. Filleting was performed at the Region 9 Laboratory by staff skilled in the preparation of fish samples. Each sample (fillet, carcass, composite, or whole fish) was transferred to pre-cleaned aluminum foil, double wrapped in foil, placed in a pre-labeled ziplock bag, and sealed in a second ziplock bag. The fish were shipped on dry ice, by overnight shipper, to the laboratory. All samples were then packaged in pre-cleaned aluminum foil, and placed in pre-labeled double ziplock bags. The samples were placed on dry ice for shipment overnight to the laboratory providing the analysis (Test America). Results for pesticides, percent lipid and percent wet weight were

expected in 3 to 6 weeks. Copies of the chain-of-custody forms are provided in Attachment A.

15. Fish tissue types received by the lab included whole single fish, whole composites consisting of multiple specimens of similar size range, fillets and carcasses. The fish tissues received at the lab were homogenized and extracted by tissuemizer. The sample extracts received a GPC clean-up, a silica gel column clean-up and a Florisil cartridge clean-up. A portion of the pre-GPC extract volume of each sample was used to perform the percent lipids determination. The extracts were analyzed for chlorinated pesticides by SW846 Method 8081A. The results for the fillets and carcass samples were used to calculate the whole fish result. The results are reported in Tables 3 through 7.

Sampling Results

Fish tissue samples were analyzed by Test America for organochlorine pesticides by USEPA Method 8081A, percent lipids and percent moisture using laboratory specific methods. Analytical results were annotated with validation flags, as appropriate, by the analytical laboratory and the validation office. A summary of the results, designated as whole fish, composites of multiple specimens, fillets or carcasses (total DDT and Dieldrin only) is reported in Table 2.

TABLE 2DDT and Dieldrin in Fish Tissue
United Heckathorn Superfund Site

Location	Sample ID	Sample Type	Species	Total DDT (µg/kg)	Dieldrin (µg/kg)
Inner Richmond Harbor	3031-F-18-0508-F	composite	Anchovy	32.6	2.3
	3031-F-19-0508-F	composite	Anchovy	48	2.7
	3031-F-20-0508-F	composite	Anchovy	37.7	2.2
	3031-F-21-0508-F	composite	Anchovy	33.1	2.3
Inner Richmond Harbor	3031-F-16-0508-F	composite	Bay Shrimp	8.41	<0.80
	3031-F-17-0508-F	composite	Bay Shrimp	9.5	<0.80
Inner Richmond Harbor	3031-F-09-0508	carcass	Halibut	104.85	1.4
	3031-F-09-0508-F	fillet	Halibut	11.8	<0.80
	3031-F-09-0508-W	whole (c)	Halibut	50.4	0.82
	3031-F-09-0508D	carcass	Halibut	106.6	1.6
	3031-F-09-0508-FD	fillet	Halibut	14.4	<0.80
	3031-F-09-0508-WD	whole (c)	Halibut	52.68	0.9
	3031-F-10-0508	carcass	Halibut	116.6	2.5
	3031-F-10-0508-F	fillet	Halibut	21.1	<0.80
	3031-F-10-0508-W	whole (c)	Halibut	66.8	1.4
Inner Richmond Harbor	3031-F-07-0508-F	composite	Sanddab	14	2.1 J
Inner Richmond Harbor	3031-F-05-0508-F	composite	Sculpin	8.9	<0.80 J
	3031-F-06-0508-F	composite	Sculpin	11.4	1.1 J
Inner Richmond Harbor	3031-F-01-0508-F	whole	Shiner Surfperch	70.6	3.2
		whole	Shiner Surfperch	70.2	3.3 J
	3031-F-02-0508-F	whole	Shiner Surfperch	63.5	5.5 J
		whole	Shiner Surfperch	92.7	7.9 J
	3031-F-04-0508-F	whole	Shiner Surfperch	61.7	3.6
		whole	Shiner Surfperch	62.49	3.9
	3031-F-12-0508-F	whole	Shiner Surfperch	111	3.9
		whole	Shiner Surfperch	68.4	3.3
	3031-F-15-0508-F	composite	Shiner Surfperch	50.43	2.1
Inner Richmond Harbor	3031-F-08-0508	carcass	Starry Flounder	34.1	3.1
		fillet	Starry Flounder	12.37	1.3 J
	3031-F-08-0508-W	whole (c)	Starry Flounder	22.4	2.13
		carcass	Starry Flounder	39.1	3.5
	3031-F-11-0508	carcass	Starry Flounder	43	2.4
	3031-F-11-0508-F	fillet	Starry Flounder	7.45	<0.80
		whole (c)	Starry Flounder	26	1.44

TABLE 2
 DDT and Dieldrin in Fish Tissue
 United Heckathorn Superfund Site

Location	Sample ID	Sample Type	Species	Total DDT (µg/kg)	Dieldrin (µg/kg)
			Flounder		
Lauritzen Channel - South	3032-F-03-0508-F	composite	Anchovy	45	5.7
	3032-F-02-0508-F	composite	Anchovy	33.4	3.2
Lauritzen Channel - South	3032-F-01-0508-F	composite	Anchovy	36	3.1
Lauritzen Channel - South	3032-F-06-0508-F	composite	Bay Shrimp	25.17	0.81
	3032-F-07-0508-F	composite	Bay Shrimp	36	0.85
	3032-F-07-0508-FD	composite	Bay Shrimp	37.5	0.91
Lauritzen Channel - South	3032-F-04-0508-F	composite	Flounder/goby	53.5	3.4 NJ
Lauritzen Channel - South	3032-F-05-0508-F	composite	Sculpin	84	6.6 J
Lauritzen Channel - North	3033-F-12-0508-F	composite	Anchovy	688.8	66
	3033-F-13-0508-F	composite	Anchovy	733.1	69
	3033-F-14-0508-F	composite	Anchovy	496.7	55
Lauritzen Channel - North	3033-F-15-0508-F	composite	Goby	5863	320
Lauritzen Channel - North	3033-F-20-0508	carcass	Jacksmelt	214.8	30
	3033-F-20-0508-F	fillet	Jacksmelt	91.1	13
	3033-F-20-0508-W	whole (c)	Jacksmelt	163	22.9
	3033-F-20-0508-FD	fillet	Jacksmelt	100.8	14
	3033-F-16-0508	carcass	Jacksmelt	48.76	14
	3033-F-16-0508-F	fillet	Jacksmelt	28.34	10
	3033-F-16-0508-W	whole (c)	Jacksmelt	39.1	12.1
	3033-F-17-0508	carcass	Jacksmelt	1069	390
	3033-F-17-0508-F	fillet	Jacksmelt	232.5	90
	3033-F-17-0508-W	whole (c)	Jacksmelt	709	261
	3033-F-18-0508	carcass	Jacksmelt	1092	330
	3033-F-18-0508-F	fillet	Jacksmelt	222	70
	3033-F-18-0508-W	whole (c)	Jacksmelt	719	218
	3033-F-18-0508D	carcass	Jacksmelt	1195	340
	3033-F-19-0508	carcass	Jacksmelt	1614	340
	3033-F-19-0508-F	fillet	Jacksmelt	397.9	96
	3033-F-19-0508-W	whole (c)	Jacksmelt	1050	227
Lauritzen Channel - North	3033-F-08-0508-F	whole	Sculpin	744.5	72
	3033-F-09-0508-F	composite	Sculpin	1079	130
	3033-F-10-0508-F	composite	Sculpin	1648	110
	3033-F-10-0508-FD	composite	Sculpin	1557	98
	3033-F-11-0508-F	composite	Sculpin	892.5	110
Lauritzen Channel - North	3033-F-02-0508-F	whole	Shiner Surfperch	11000	260
	3033-F-03-0508-F	composite	Shiner	601.6	280

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DDT and Dieldrin in Fish Tissue
United Heckathorn Superfund Site

Location	Sample ID	Sample Type	Species	Total DDT (µg/kg)	Dieldrin (µg/kg)
Lauritzen Channel - North	3033-F-03-0508-FD	composite	Surfperch Shiner	526	240
	3033-F-04-0508-F	whole	Surfperch Shiner	7681	330
	3033-F-05-0508-F	composite	Shiner Surfperch	2025	130
	3033-F-01-0508-F	whole	Shiner Surfperch	10216	550
Lauritzen Channel - North	3033-F-07-0508-F	composite	Starry Flounder	2743	180
	3033-F-06-0508-F	whole	Starry Flounder	6721	300
Santa Fe Channel	3034-F-15-0508-F	composite	Bay Shrimp	27.12	1.1 J
	3034-F-16-0508-F	composite	Bay Shrimp	46	1.5
	3034-F-17-0508-F	composite	Bay Shrimp	43.9	1.4
	3034-F-18-0508-F	composite	Bay Shrimp	44.9	1.7
	3034-F-19-0508-F	composite	Bay Shrimp	46.7	1.5 NJ
Santa Fe Channel	3034-F-20-0508-F	composite	Goby	88.9	6.5
Santa Fe Channel	3034-F-25-0508	carcass	Jacksmelt	96.8	24
	3034-F-25-0508-F	fillet	Jacksmelt	27	9.4
	3034-F-25-0508-W	whole (c)	Jacksmelt	68	18
	3034-F-25-0508-FD	fillet	Jacksmelt	24.8	8.9
	3034-F-26-0508	carcass	Jacksmelt	50.5	7
	3034-F-26-0508-F	fillet	Jacksmelt	14.4	2.4
	3034-F-21-0508	carcass	Jacksmelt	167.3	45
	3034-F-26-0508-W	whole (c)	Jacksmelt	34.1	4.91
	3034-F-21-0508-F	fillet	Jacksmelt	56.1	15
	3034-F-21-0508-W	whole (c)	Jacksmelt	116	31.1
	3034-F-22-0508	carcass	Jacksmelt	108.2	19
	3034-F-22-0508-F	fillet	Jacksmelt	29.5	5.8
	3034-F-22-0508-W	whole (c)	Jacksmelt	74.7	13.4
	3034-F-23-0508	carcass	Jacksmelt	245.4	66
	3034-F-23-0508-F	fillet	Jacksmelt	42.1	12
	3034-F-23-0508-W	whole (c)	Jacksmelt	159	43.1
3034-F-24-0508	carcass	Jacksmelt	160	22	
3034-F-24-0508-F	fillet	Jacksmelt	65.87	8.3	
3034-F-24-0508-W	whole (c)	Jacksmelt	116	15.6	
Santa Fe Channel	3034-F-09-0508-F	composite	Sanddab	65.9	4.9 J
	3034-F-10-0508-F	composite	Sanddab	65.9	4.7 J
	3034-F-11-0508-F	composite	Sanddab	124.5	8.9
Santa Fe Channel	3034-F-12-0508-F	whole	Shiner Surfperch	143	13 J
	3034-F-13-0508-F	whole	Shiner Surfperch	26.1	5 J
	3034-F-14-0508-F	whole	Shiner	272.4	16

TABLE 2
 DDT and Dieldrin in Fish Tissue
 United Heckathorn Superfund Site

Location	Sample ID	Sample Type	Species	Total DDT (µg/kg)	Dieldrin (µg/kg)
			Surfperch		
Santa Fe Channel	3034-F-08-0508-F	composite	Staghorn Sculpin	100	5.9
Santa Fe Channel	3034-F-05-0508-F	composite	Starry Flounder	94.1	8.5
	3034-F-06-0508-F	whole	Starry Flounder	123	9.7
	3034-F-07-0508-F	whole	Starry Flounder	105.9	6.2
	3034-F-07-0508-FD	whole	Starry Flounder	129.8	6.2
	3034-F-01-0508-F	whole	Starry Flounder	136.1	9 J
	3034-F-02-0508-F	whole	Starry Flounder	210.1	18
	3034-F-03-0508-F	whole	Starry Flounder	162.3	12
	3034-F-04-0508-F	whole	Flounder	74.5	5.4 J
Parr Canal	3036-F-01-0508-F	composite	Staghorn Sculpin	679.1	9.8 NJ
	3036-F-02-0508-F	composite	Staghorn Sculpin	497.4	15
	3036-F-03-0508-F	composite	Staghorn Sculpin	287.1	6.5
	3036-F-04-0508-F	composite	Staghorn Sculpin	816	17
	3036-F-05-0508-F	composite	Staghorn Sculpin	366.2	7.6
	3036-F-06-0508-F	whole	Staghorn Sculpin	1291	32
	3036-F-07-0508-F	composite	Staghorn Sculpin	345.1	7.7
	3036-F-07-0508-FD	composite	Staghorn Sculpin	405.2	9.3
Parr Canal	3036-F-08-0508-F	composite	Walleyed Perch	300	19
	3036-F-09-0508-F	composite	Walleyed Perch	158	15
	3036-F-09-0508-FD	composite	Walleyed Perch	180.5	16
	3036-F-10-0508-F	composite	Walleyed Perch	88.7	9.1
	3036-F-11-0508-F	composite	Walleyed Perch	184.9	14

Notes:

µg/kg: microgram per kilogram (ppb)

D: Field duplicate

C: Calculated

J: Estimated result

TABLE 2
DDT and Dieldrin in Fish Tissue
United Heckathorn Superfund Site

Location	Sample ID	Sample Type	Species	Total DDT (µg/kg)	Dieldrin (µg/kg)
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NJ: Estimated and presumptively identified

<: Not detected at reporting limit

Composite: Due to the small size of the fish, multiple fish were combined to make up the sample

Fillet: If the fish were large enough to provide sufficient mass after filleting (typically greater than 7 inches), the fish were filleted and the carcass and fillet (skin on) were sent to the laboratory as separate samples

Whole: A whole single fish, including head, bones and gut content.

Whole (c): The whole fish result was calculated by adding the amount (in mg) of total DDT in the fillet to the amount (in mg) of total DDT in the carcass and dividing by the total mass of the fish to determine the total concentration if the whole fish. For instance, if the fillet portion weighed 200 grams (or 0.2 kg) and contained total DDT of 1 mg/kg and the carcass weighed 300 grams (0.3 kg) with a total DDT concentration of 0.5 mg/kg, the whole fish weighed 500 grams (0.5 kg). The amount of mg of total DDT can be calculated by 1 mg/kg X 0.2 kg = 0.2 mg in the fillet and 0.3 kg X 0.5 mg/kg = 0.15 mg in the carcass. When the two are added together and divided by the total weight of the fish (0.2 mg + 0.15 mg / 0.5 kg) the total calculated fish concentration is 0.7 mg/kg.

Complete tabulated results for all samples are provided in Tables 3 through 7. Collected Fish Samples by species and associated SDG grouping numbers are provided in Table 8.

Six unvalidated Sample Data Groups (SDGs) sets containing analytical fish tissue results were received electronically on July 31, 2008. The SDG packages were submitted to USEPA's validation office for review on August 2, 2008. Tier 3-level validation of DDT isomers; 4'-DDT; 4,4'-DDE; 4,4'-DDD; 2,4'-DDT; 2,4'-DDE; 2,4'-DDD; and dieldrin and Tier 1A forms review on the remaining analytes were performed. The data review was completed on September 3, 2008 and validation Reports are provided in Attachment B.

The Sampling and Analysis Plan targeted white croakers and shiner surfperch as species that would be most representative of the fish caught by fishermen in the area. No white croakers were collected either by trawling or by angling. Shiner surfperch were collected at 3 of the 5 locations (Stations 303.1, 303.4, and 303.3).

Other species that were targeted in the SAP included bay goby, Pacific anchovy, speckled sanddab, starry flounder, English sole and staghorn sculpin. All of these species were collected at a variety of locations, excluding the English sole. Other species that were collected include jacksmelt, bay shrimp, and California halibut.

Concentration Summary by Sampling Segments

The sum of the concentrations of the DDT isomers and degradation products (2,4'-DDT; 4,4'-DDT; 2,4'-DDD; 4,4'-DDD; 2,4'-DDE; and 4,4'-DDE) is expressed as total DDT. Total DDT and Dieldrin concentration ranges (expressed in wet weight) found in whole or composite fish recovered from each Sampling Station are as follows:

- Station 303.1 – 7.45 to 117 µg/kg DDT and <0.80- 7.9 ug/kg Dieldrin
- Station 303.2 – 25 to 84 µg/kg DDT and 0.81- 6.6 ug/kg Dieldrin
- Station 303.3 – 39 to 11,000 µg/kg DDT and 28- 550 ug/kg Dieldrin
- Station 303.4 – 14 to 272 µg/kg DDT and 1.1- 66 ug/kg Dieldrin
- Station 303.6 – 89-1291 µg/kg DDT and 6.5-32 ug/kg Dieldrin

Total DDT and Dieldrin concentrations from fish collected from locations within the Lauritzen Channel (Station 303.3) were found to contain significantly more total DDT and Dieldrin relative to fish collected at locations with the Santa Fe Channel, Parr Canal and Inner Richmond Harbor. In particular, five specimens (three whole shiner surfperch, one whole starry flounder and one composite of goby) were above the total DDT FDA limit of 5,000 µg/kg.

Concentration Summary by Species

When species specific results between locations are compared, the same trend is seen.

Anchovy (estuarine species feeding on crustaceans and fish larvae) whole or composite sample:

- Station 303.1: Average DDT concentration is approximately 38 µg/kg
- Station 303.2: Average DDT concentration is approximately 38 µg/kg
- Station 303.3: Average DDT concentration 640 µg/kg

Shiner surfperch (demersal – also feeds on pier pilings) whole or composite sample:

- Stations 303.1 and 303.4: Average DDT concentration is approximately 91 µg/kg
- Station 303.3: Average DDT concentration is approximately 5,342 µg/kg

Staghorn sculpin (demersal, hard-soft bottom species) whole or composite sample:

- Stations 303.1, 303.2, 303.4, and 303.6: Average DDT concentration is approximately 408 µg/kg
- Station 303.3: Average DDT concentration is approximately 1,184 µg/kg.

Jacksmelt (surface oriented pelagic species) whole or composite sample:

- Stations 303.1 and 303.2: Average DDT concentration is approximately 94.5 µg/kg
- Station 303.3: Average DDT concentration is approximately 536 µg/kg.

The average results for individual species samples from within the Lauritzen Channel were found to be between 3 and 59 times the average results for the same species outside the Lauritzen Channel. Shiner surfperch showed the largest relative increase in contaminant concentrations: total DDT concentrations were 59 times greater in the Lauritzen Channel than those that were collected outside the Channel.

The percent lipids measured in the whole or composite fish ranged from 0.9 percent to 6.5 percent, with the majority of the samples having less than 4 percent lipids. Fifteen shiner surfperch, walleyed perch and anchovy samples ranged from 4 to 6.5 percent lipids.

Next Steps

Results from the fish tissue analysis will be reviewed in conjunction with historical data collected from previous investigations to define the current extent of DDT and dieldrin in fish biota. Risks to human health and the environment will be assessed using previously prepared Risk Assessments and reviewing updated data and risk assessment methodology. Based upon the results of human health and ecological risk reviews, these results will be used as the basis for recommendations toward evaluating current cleanup standards and

site-specific cleanup criteria and recommendations on the selection, design and costing of potential remedial alternatives and future monitoring program to evaluate effectiveness of the selected remedy.

Tables, Figures and Attachments

Table 1. Fish Sample Collection Report

Table 2. Total DDT and Dieldrin in Fish Tissues

Table 3. Results of the Fish Tissue Analysis for Station 303.1

Table 4. Results of the Fish Tissue Analysis for Station 303.2

Table 5. Results of the Fish Tissue Analysis for Station 303.3

Table 6. Results of the Fish Tissue Analysis for Station 303.4

Table 7. Results of the Fish Tissue Analysis for Station 303.6

Table 8. Fish Collection SDG Sample Key

Figure 1: Project Area

Figure 2: Proposed Fish Trawl Sample Locations

Figure 3. Actual Fish Trawl Sample Locations

Attachment A: Fish Chain-of-Custody Forms

Attachment B: Tier 3 Validation Reports

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Tables

Table 3
 Results of Tissue Pesticides Inner Richmond Harbor Location 303.1
 United Heckathorn Superfund Site

Sample ID	3031-F-18-0508-F	3031-F-19-0508-F	3031-F-20-0508-F	3031-F-21-0508-F	3031-F-16-0508-F	3031-F-17-0508-F	3031-F-09-0508	3031-F-09-0508-F	3031-F-09-0508-W	3031-F-09-0508D	3031-F-09-0508-FD	3031-F-09-0508-WD	3031-F-10-0508	3031-F-10-0508-F	3031-F-10-0508-W	3031-F-07-0508-F	3031-F-05-0508-F	3031-F-06-0508-F	
Percent Lipids	1.8	1.6	1.4	1.3	1.7	1.6	1.9	0.4	1.02	2	0.3	1.02	3.2	0.6	1.84	2.8	1.4	1.6	
Sample Date	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	
Species	Anchovy	Anchovy	Anchovy	Anchovy	Bay Shrimp	Bay Shrimp	Halibut	Halibut	Halibut	Halibut	Halibut	Halibut	Halibut	Halibut	Halibut	Sanddab	Sculpin	Sculpin	
Sample Type	composite	composite	composite	composite	composite	composite	carcass	fillet	whole (C)	carcass	fillet	whole (C)	carcass	fillet	whole (C)	composite	composite	composite	
Analyte	All Analytical Results in ug/kg																		
Pesticides																			
2,4-DDD	1.2	1.2	2.4	1.3	0.8 U	0.8 U	1.6	0.8 U	0.9	2.3	0.8 U	1.19	3.2	0.8 U	1.74	1.2 J	0.8 UJ	0.81 UJ	
2,4-DDE	2.4	2.7	2.2	2.3 NJ	0.8 U	0.8 U	6.1 NJ	1 NJ	3.12	6.4	1.1	3.3	6.2	1.5	3.75	0.8 UJ	0.8 UJ	0.81 UJ	
2,4-DDT	0.8 U	0.8 U	0.8 U	1.1 NJ	0.8 U	0.8 U	0.95 NJ	0.8 U	0.63	1.2	0.8 U	0.73	1.5 NJ	0.8 U	0.93	0.8 UJ	0.8 UJ	0.81 UJ	
4,4-DDD	11	16	14	11	1.5	1.5	15	1.9	7.34	20	3	10.06	30	5.5	17.21	5.9 J	2.9 J	4 J	
4,4-DDE	14	21	12	13	6.1	7.2	73	7.8	34.87	68	8.9	33.44	68 J	12	38.77	4.9 J	4.9 J	6 J	
4,4-DDT	4 NJ	7.1 NJ	7.1 NJ	4.4 NJ	0.81 NJ	0.8 NJ	8.2 NJ	1.1 NJ	4.05	8.7	1.4	4.43	7.7 NJ	2.1 NJ	4.78	2 NJ	1.1 NJ	1.4 NJ	
Total DDT	32.6	48	37.7	33.1	8.41	9.5	104.85	11.8	50.43	106.6	14.4	52.68	116.6	21.1	66.76	14	8.9	11.4	
Aldrin	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
alpha-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
alpha-Chlordane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	2.4 NJ	0.8 U	---	2.3	0.8 U	---	1.3 NJ	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
beta-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
delta-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Dieldrin	2.3	2.7	2.2	2.3	0.8 U	0.8 U	1.4	0.8 U	0.82	1.6	0.8 U	0.9	2.5	0.8 U	1.4	2.1 J	0.8 UJ	1.1 J	
Endosulfan I	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	1.1 NJ	0.8 U	---	1	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Endosulfan II	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Endosulfan sulfate	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	1.6 NJ	0.8 U	---	1.7	0.8 U	---	0.96 NJ	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Endrin	0.8 U	0.8 U	0.8 U	0.86	0.8 U	0.8 U	1.3	0.8 U	---	1.2	0.8 U	---	1.1	0.8 U	---	1.5 NJ	0.8 UJ	0.81 UJ	
Endrin aldehyde	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	2.1 NJ	0.8 U	---	2.1	0.8 U	---	1.1 NJ	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Gamma-BHC (Lindane)	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
gamma-Chlordane	1.5	1.5	1.3	1.3 NJ	0.8 U	0.8 U	2.8 NJ	0.8 U	---	2.9	0.8 U	---	3.5	0.85 NJ	---	0.8 UJ	0.8 UJ	0.81 J	
Heptachlor	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Heptachlor epoxide	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	---	0.8 U	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Methoxychlor	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	1.5 UJ	0.8 U	---	1.7 J	0.8 U	---	0.79 U	0.8 U	---	0.8 UJ	0.8 UJ	0.81 UJ	
Toxaphene	99 U	99 U	99 U	100 U	99 U	99 U	100 U	100 U	---	100 U	100 U	---	99 U	99 U	---	99 UJ	100 UJ	100 UJ	

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 3
 Results of Tissue Pesticides Inner Richmond Harbor Location 303.1
 United Heckathorn Superfund Site

Sample ID	3031-F-01-0508-F	3031-F-01-0508-FD	3031-F-02-0508-F	3031-F-03-0508-F	3031-F-04-0508-F	3031-F-12-0508-F	3031-F-13-0508-F	3031-F-14-0508-F	3031-F-15-0508-F	3031-F-08-0508	3031-F-08-0508-F	3031-F-08-0508-W	3031-F-08-0508D	3031-F-11-0508	3031-F-11-0508-F	3031-F-11-0508-W
Percent Lipids	1.4	1.4	5.3	4.8	2.9	5	4.5	3.3	5	4	1.5	2.66	4.7	2.8	0.7	1.79
Sample Date	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/14/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008
Species	Shiner Surfperch whole	Shiner Surfperch whole	Shiner Surfperch whole	Shiner Surfperch whole	Shiner Surfperch whole	Shiner Surfperch whole	Shiner Surfperch whole	Shiner Surfperch whole	Shiner Surfperch composite	Starry Flounder carcass	Starry Flounder fillet	Starry Flounder whole (C)	Starry Flounder carcass	Starry Flounder carcass	Starry Flounder fillet	Starry Flounder whole (C)
Analyte	All Analytical Results in ug/kg															
Pesticides																
2,4-DDD	3.6	3.9	3.8	10	2.8	3	4.8	4.4	2.4	1.9	0.8 UJ	1.09	2.1	1.5	0.8 U	0.97
2,4-DDE	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	3.4 NJ	3.9 NJ	4.3 NJ	3 NJ	0.8 U	0.8 UJ	0.4 U	0.8 UJ	2.4	0.8 U	1.44
2,4-DDT	1.5	1.7	1.5	6.9	1.4	0.99 NJ	6.3	1.6	0.93	1.8	0.87 J	1.3	2	1.1 NJ	0.8 U	0.76
4,4-DDD	21	21 J	19	33	14 J	13	19	20	11	12	4.4 J	7.91	14	10	2.1	6.22
4,4-DDE	40	39 J	33	34 J	39 J	38	58 J	33	30	14	5.4 J	9.38	16	24	4.5	14.66
4,4-DDT	4.5	4.6 NJ	6.2 NJ	8.8 NJ	4.5 NJ	4.1 NJ	19 NJ	5.1 NJ	3.1 NJ	4.4	1.7 NJ	2.95	5 NJ	4 NJ	0.85 NJ	2.49
Total DDT	70.6	70.2	63.5	92.7	61.7	62.49	111	68.4	50.43	34.1	12.37	22.42	39.1	43	7.45	25.97
Aldrin	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
alpha-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
alpha-Chlordane	2.4	2.6 NJ	1.8 NJ	2.4 NJ	1.2 NJ	1.9 NJ	1 NJ	1.8 NJ	1.1 NJ	0.96	0.8 UJ	---	1.1 J	1.3 NJ	0.8 U	---
beta-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
delta-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
Dieldrin	3.2	3.3 J	5.5 J	7.9 J	3.6	3.9	3.9	3.3	2.1	3.1	1.3 J	2.13	3.5	2.4	0.8 U	1.44
Endosulfan I	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
Endosulfan II	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 U	0.79 U	0.8 U	---
Endosulfan sulfate	0.8 U	0.8 U	0.8 U	0.88 NJ	0.8 U	0.81 NJ	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 U	0.79 U	0.8 U	---
Endrin	0.8 U	0.8 U	5.9	1.4	1.4	1.5	1.8 NJ	1.2	1.5 NJ	0.85	0.8 UJ	---	0.8	0.79 U	0.8 U	---
Endrin aldehyde	0.8 U	0.87 NJ	0.8 U	0.8 U	0.8 UJ	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
Gamma-BHC (Lindane)	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
gamma-Chlordane	2.3	2.6 NJ	2.2 NJ	3.7	1.7 NJ	1.6 NJ	2 NJ	2 NJ	1.3 NJ	1.4	0.8 UJ	---	1.5	1.1 NJ	0.8 U	---
Heptachlor	0.96	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---							
Heptachlor epoxide	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 UJ	0.79 U	0.8 U	---
Methoxychlor	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	---	0.8 U	0.79 U	0.8 U	---
Toxaphene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 UJ	---	99 U	99 U	100 U	---

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 4
 Results of Tissue Pesticides Lauritzen Channel - South Location 303.2
 United Heckathorn Superfund Site

Sample ID	3032-F-03-0508-F	3032-F-02-0508-F	3032-F-01-0508-F	3032-F-06-0508-F	3032-F-07-0508-F	3032-F-07-0508-FD	3032-F-04-0508-F	3032-F-05-0508-F
Percent Lipids	6.5	6.5	2.6	1.4	1.5	1.4	2.1	1.9
Sample Date	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008
Species	Anchovy	Anchovy	Anchovy	Bay Shrimp	Bay Shrimp	Bay shrimp	Flounder/goby	Sculpin
Sample Type	composite	composite	composite	composite	composite	composite	composite	composite
Analyte	All Analytical Results in ug/kg							
Pesticides								
2,4-DDD	3.6	2.2	2.4 NJ	0.87	1.1	1.3	2.8	4.4
2,4-DDE	4.5 J	0.8 U	4.1 J	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
2,4-DDT	1.2 NJ	0.8 U	2.3	1.8				
4,4-DDD	12	7.9	9.6	3.6	4.8	4.1 J	21 J	32
4,4-DDE	21	21	17	19	28	30 NJ	19 J	37 J
4,4-DDT	2.7 NJ	2.3 NJ	2.9 NJ	1.7 J	2.1	2.1 J	8.4 J	8.8 NJ
Total DDT	45	33.4	36	25.17	36	37.5	53.5	84
Aldrin	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
alpha-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
alpha-Chlordane	1.5 NJ	1.8 NJ	1.3 NJ	0.8 U	0.8 U	0.8 U	0.8 U	1.1 NJ
beta-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
delta-BHC	0.8 U	0.8 U	0.8 UJ	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Dieldrin	5.7	3.2	3.1	0.81	0.85	0.91	3.4 NJ	6.6 J
Endosulfan I	1.1	1.1 NJ	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Endosulfan II	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Endosulfan sulfate	0.8 U	0.8 U	0.8 UJ	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Endrin	20 NJ	25	0.8 U	0.8 U	0.8 U	0.8 U	2.2 NJ	1.6
Endrin aldehyde	0.8 U	0.8 U	0.8 UJ	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Gamma-BHC (Lindane)	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
gamma-Chlordane	1.9	1.8	0.8 U	0.8 U	0.8 U	0.8 U	1.1 NJ	2 NJ
Heptachlor	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.94
Heptachlor epoxide	1.2 NJ	0.8 U	0.8 U	0.8 U				
Methoxychlor	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Toxaphene	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 5
 Results of Tissue Pesticides Lauritzen Channel - North Location 303.3
 United Heckathorn Superfund Site

Sample ID	3033-F-12-0508-F	3033-F-13-0508-F	3033-F-14-0508-F	3033-F-15-0508-F	3033-F-16-0508	3033-F-16-0508-F	3033-F-16-0508-W	3033-F-17-0508	3033-F-17-0508-F	3033-F-17-0508-W	3033-F-18-0508	3033-F-18-0508-F	3033-F-18-0508-W	3033-F-18-0508D	3033-F-19-0508	3033-F-19-0508-F	3033-F-19-0508-W
Percent Lipids	1.7	1.8	1.5	1.5	1	0.5	0.76	4.8	0.2	2.82	4.2	0.8	2.74	3.5	3.4	0.9	2.25
Sample Date	5/15/2008	5/15/2008	5/15/2008	5/15/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008
Species	Anchovy	Anchovy	Anchovy	Goby	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt
Sample Type	composite	composite	composite	composite	carcass	fillet	whole (C)	carcass	fillet	whole (C)	carcass	fillet	whole (C)	carcass	carcass	fillet	whole (C)
Analyte	All Analytical Results in ug/kg																
Pesticides																	
2,4-DDD	46	63	46	360	1.2 NJ	0.84 NJ	1.03	56	12	37.06	40	7.2	25.93	43	34	8.9	22.42
2,4-DDE	4.8 J	5.1 J	3.7 J	20 J	1.3 J	0.8 U	0.88	9.8 J	2.3 J	6.57	13	2.4 J	8.45	11 J	11 J	2.9 J	7.26
2,4-DDT	21	35	29	23	0.86	0.8 U	0.64	23	5.2	15.34	29	5.4	18.88	31	29	8.1	19.36
4,4-DDD	370	420	270	4800	11 J	7	9.11	670	140	441.83	570	120	376.98	660	950	220	613.13
4,4-DDE	97	90	71	410	28	17	22.81	170	39	113.6	220	44	144.51	230	280	74	184.94
4,4-DDT	150	120	77	250	6.4	3.5 NJ	5.03	140	34	94.37	220	43	144.08	220	310	84	205.71
Total DDT	688.8	733.1	496.7	5863	48.76	28.34	39.12	1068.8	232.5	708.76	1092	222	718.83	1195	1614	397.9	1052.8
Aldrin	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
alpha-BHC	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
alpha-Chlordane	2.1	2.3	1.6	10	0.8 U	0.8 U	---	8 U	1.1	---	8 U	1	---	8 U	8 U	1.5	---
beta-BHC	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
delta-BHC	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
Dieldrin	66	69	55	320	14	10	12.11	390	90	260.85	330	70	218.48	340	340	96	227.4
Endosulfan I	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
Endosulfan II	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
Endosulfan sulfate	1.6 U	1.6 U	0.79 U	1.6 U	0.8 J	0.8 J	---	8 J	0.8 J	---	8 U	0.8 J	---	8 J	8 J	0.8 J	---
Endrin	3.3	3.5	2.5 NJ	3.9 NJ	0.8 U	0.8 U	---	12	2.8	---	8.6	1.8	---	8.9	9.5	2.9	---
Endrin aldehyde	1.6 U	1.6 U	0.79 U	1.6 U	0.8 J	0.8 J	---	8 J	0.8 J	---	8 U	0.8 J	---	8 J	8 J	0.8 J	---
Gamma-BHC (Lindane)	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
gamma-Chlordane	2 NJ	2.1 NJ	1.5 NJ	12 NJ	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.83 NJ	---
Heptachlor	1.6 U	1.6 U	0.79 U	1.6 U	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.8 U	---
Heptachlor epoxide	1.6 U	1.6 U	1.3 NJ	6.1 NJ	0.8 U	0.8 U	---	8 U	0.8 U	---	8 U	0.8 U	---	8 U	8 U	0.85 NJ	---
Methoxychlor	1.6 U	1.6 U	0.79 U	1.6 U	0.8 J	0.8 J	---	8 J	0.8 J	---	8 U	0.8 J	---	8 J	8 J	0.8 J	---
Toxaphene	200 U	200 U	99 U	200 U	100 U	100 U	---	1000 U	100 U	---	1000 U	100 U	---	1000 U	990 U	100 U	---

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 5
 Results of Tissue Pesticides Lauritzen Channel - North Location 303.3
 United Heckathorn Superfund Site

Sample ID	3033-F-20-0508	3033-F-20-0508-F	3033-F-20-0508-W	3033-F-20-0508-FD	3033-F-08-0508-F	3033-F-09-0508-F	3033-F-10-0508-F	3033-F-10-0508-FD	3033-F-11-0508-F	3033-F-02-0508-F	3033-F-03-0508-F	3033-F-03-0508-FD	3033-F-04-0508-F	3033-F-05-0508-F	3033-F-01-0508-F	3033-F-07-0508-F	3033-F-06-0508-F
Percent Lipids	1.7	4.3	2.78	0.5	1.4	1.9	1.5	1.3	1.4	4.3	3.1	3.3	4.1	4.7	4.8	1.3	1.6
Sample Date	6/12/2008	6/12/2008	6/12/2008	6/12/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008
Species	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Sculpin	Sculpin	Sculpin	Sculpin	Sculpin	Shiner Surfperch	Shiner Surfperch	Shiner Surfperch	Shiner Surfperch	Shiner Surfperch	Shiner Surfperch	Starry Flounder	Starry Flounder
Sample Type	carcass	fillet	whole (C)	fillet	whole	composite	composite	composite	composite	whole	composite	composite	whole	composite	whole	composite	whole
Analyte	All Analytical Results in ug/kg																
Pesticides																	
2,4-DDD	4.5	1.9	3.42	2.1	58	89	130	110	98	1000	100	90	710	190	1500	330	490
2,4-DDE	4.3 J	2	3.34	2.2 J	5.5 J	7.2 J	12	13 J	6.5 J	110 NJ	8.6 J	11	43 J	15 J	68 NJ	23 J	51 J
2,4-DDT	3	1.2	2.25	1.5	25	39	66	54	28	390	140	120	98	190	88	180	100
4,4-DDD	84	35	63.58	39	460	680	920	880	540	6100	150	130	5800	560	7500	1400	4300
4,4-DDE	84	37	64.41	41	66	94	270	250	110	2200	93	80	750	760	850 J	400	1400
4,4-DDT	35	14	26.25	15	130	170	250	250	110	1200	110	95	280	310	210	410	380
Total DDT	214.8	91.1	163.25	100.8	744.5	1079.2	1648	1557	892.5	11000	601.6	526	7681	2025	10216	2743	6721
Aldrin	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
alpha-BHC	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
alpha-Chlordane	0.98 NJ	0.8 U	---	0.8 U	2.2	4 U	4 U	4	3.3	47	2.8	2.8	16 U	4.4 NJ	23	6.7	24
beta-BHC	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
delta-BHC	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
Dieldrin	30	13	22.92	14	72	130	110	98	110	260	280	240	330	130	550	180	300
Endosulfan I	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
Endosulfan II	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.93 NJ	1.3	16 U	4 U	16 U	4 U	16 U
Endosulfan sulfate	0.8 J	0.8 U	---	0.8 J	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	2.2	16 U	4 U	16 U	4 U	16 U
Endrin	0.8 U	0.8 U	---	0.8 U	2.1 NJ	4.7	4 U	4 U	4.6	16 U	6.6 NJ	6.1	16 U	4 U	16 U	4 U	16 U
Endrin aldehyde	0.8 J	0.8 U	---	0.8 J	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
Gamma-BHC (Lindane)	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
gamma-Chlordane	0.8 U	0.8 U	---	0.8 U	1.9 NJ	4 U	4 U	4.4 NJ	3.4 NJ	47 NJ	2.4 NJ	1.9	19 NJ	4 U	30 NJ	4.8 NJ	19 NJ
Heptachlor	0.8 U	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
Heptachlor epoxide	1.2 NJ	0.8 U	---	0.8 U	1.6 U	4 U	4 U	4 U	1.6 U	16 U	1.8 NJ	2	16 U	4 U	16 U	4 U	16 U
Methoxychlor	0.8 J	0.8 U	---	0.8 J	1.6 U	4 U	4 U	4 U	1.6 U	16 U	0.81 U	0.8 U	16 U	4 U	16 U	4 U	16 U
Toxaphene	100 U	100 U	---	100 U	200 U	500 U	500 U	500 U	200 U	2000 U	100 U	100 U	2000 U	500 U	2000 U	500 U	2000 U

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 6
 Results of Tissue Pesticides Santa Fe Channel Location 303.4
 United Heckathorn Superfund Site

Sample ID	3034-F-15-0508-F	3034-F-16-0508-F	3034-F-17-0508-F	3034-F-18-0508-F	3034-F-19-0508-F	3034-F-20-0508-F	3034-F-21-0508	3034-F-21-0508-F	3034-F-21-0508-W	3034-F-22-0508	3034-F-22-0508-F	3034-F-22-0508-W	3034-F-23-0508	3034-F-23-0508-F	3034-F-23-0508-W	3034-F-24-0508	3034-F-24-0508-F	3034-F-24-0508-W
Percent Lipids	1.6	1.5	1.4	1.5	1.5	1.4	3.4	1.1	2.33	3.9	1	2.67	6	1	3.88	1.3	0.6	0.97
Sample Date	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008
Species	Bay Shrimp	Bay Shrimp	Bay Shrimp	Bay Shrimp	Bay Shrimp	Goby	Jacksmelt	Jacksmelt	Jacksmelt									
Sample Type	composite	composite	composite	composite	composite	composite	carcass	fillet	whole (C)									
Analyte	All Analytical Results in ug/kg																	
Pesticides																		
2,4-DDD	0.82 J	1.5 NJ	1.2	1.6	1.3	3.7	8.5	3	5.94	8.7	2.5	6.06	8.4	1.5	5.47	2.2	0.87	1.58
2,4-DDE	0.8 UJ	0.8 U	7.8 J	2.9 J	5.52	3.3 J	0.8 U	2.07	9.2 J	2 J	6.15	4.7 J	2.1 J	3.48				
2,4-DDT	0.8 UJ	0.8 U	0.8 U	1.6	1.5	2.2	3	1.1	2.12	4.2	1.2	2.92	3.8	0.8 U	2.36	1.1 NJ	0.8 U	0.77
4,4-DDD	4.9 J	7.4 J	4.9 J	6.2 J	5.1 J	39 J	78	25	53.35	42	12	29.23	120	20	77.6	43	17	30.85
4,4-DDE	19 J	33 J	35 J	32	35	32	52	18	36.18	37	9.9	25.46	79	14	51.44	89	38	65.16
4,4-DDT	2.4 J	4.1	2.8	3.5 NJ	3.8 NJ	12 NJ	18 NJ	6.1 NJ	12.46	13	3.9	9.13	25	4.6 NJ	16.35	20 NJ	7.9 NJ	14.34
Total DDT	27.12	46	43.9	44.9	46.7	88.9	167.3	56.1	115.57	108.2	29.5	74.7	245.4	42.1	159.2	160	65.87	116
Aldrin	0.8 UJ	0.8 U	0.8 U	0.8 U	---													
alpha-BHC	0.8 UJ	0.8 U	0.8 U	0.8 U	---													
alpha-Chlordane	0.8 UJ	0.8 U	1.1 NJ	0.8 U	---	0.91 NJ	0.8 U	---	1.8 NJ	0.8 U	---	0.8 U	0.8 U	---				
beta-BHC	0.8 UJ	0.8 U	0.8 U	0.8 U	---													
delta-BHC	0.8 UJ	0.8 U	0.8 U	0.8 U	---													
Dieldrin	1.1 J	1.5	1.4	1.7	1.5 NJ	6.5	45	15	31.05	19	5.8	13.38	66	12	43.1	22	8.3	15.6
Endosulfan I	0.8 UJ	0.8 U	0.8 U	0.8 U	---	0.82	0.8 U	---	0.8 U	0.8 U	---	0.8 U	0.8 U	---				
Endosulfan II	0.8 UJ	0.8 U	0.8 U	0.8 U	---													
Endosulfan sulfate	0.8 UJ	0.8 U	0.8 J	0.8 J	---													
Endrin	0.8 UJ	0.8 U	0.8 U	0.8 U	0.8 U	1.1	1.1 NJ	0.8 U	---	0.8 U	0.8 U	---	1.6 NJ	0.8 U	---	0.8 U	0.8 U	---
Endrin aldehyde	0.8 UJ	0.8 U	0.8 J	0.8 J	---													
Gamma-BHC (Lindane)	0.8 UJ	0.8 U	0.8 U	0.8 U	---													
gamma-Chlordane	0.8 UJ	0.8 U	0.8 U	0.8 U	0.8 U	1.4 NJ	0.94 NJ	0.8 U	---	0.8 U	0.8 U	---	1.4 NJ	0.8 U	---	0.8 U	0.8 U	---
Heptachlor	0.8 UJ	0.8 U	0.8 U	0.8 U	---													
Heptachlor epoxide	0.8 UJ	0.8 U	2.9 NJ	1 NJ	---	1.3 NJ	0.8 U	---	4.2 NJ	0.96 NJ	---	1.8 NJ	0.8 U	---				
Methoxychlor	0.8 UJ	0.8 U	0.8 J	0.8 J	---													
Toxaphene	100 UJ	100 U	100 U	100 U	---													

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 6
 Results of Tissue Pesticides Santa Fe Channel Location 303.4
 United Heckathorn Superfund Site

Sample ID	3034-F-25-0508	3034-F-25-0508-F	3034-F-25-0508-W	3034-F-25-0508-FD	3034-F-26-0508	3034-F-26-0508-F	3034-F-26-0508-W	3034-F-09-0508-F	3034-F-10-0508-F	3034-F-11-0508-F	3034-F-08-0508-F	3034-F-12-0508-F	3034-F-13-0508-F	3034-F-14-0508-F	3034-F-01-0508-F	3034-F-02-0508-F	3034-F-03-0508-F	3034-F-04-0508-F	
Percent Lipids	1.8	0.3	1.18	0.6	4.1	1.3	2.83	2.5	1.8	2.4	1.4	4.3	2.5	4.9	1.7	2	1.7	2	
Sample Date	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	6/12/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	
Species	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Jacksmelt	Sanddab	Sanddab	Sanddab	Sculpin	Shiner Surfperch	Shiner Surfperch	Shiner Surfperch	Starry Flounder	Starry Flounder	Starry Flounder	Starry Flounder	
Sample Type	carcass	fillet	whole (C)	fillet	carcass	fillet	whole (C)	composite	composite	composite	composite	whole							
Analyte	All Analytical Results in ug/kg																		
Pesticides																			
2,4-DDD	7.2	0.8 U	4.4	0.8 U	1.8	0.79 U	1.16	4.8 J	3.7 J	7 J	1.7 J	11 J	3 UJ	12	8	16	9.9	4.6 J	
2,4-DDE	2.7	1.4	2.16	1.4	1.6	0.79 U	1.05	0.8 UJ	0.8 U	8.1 J	7.3 J	0.8 UJ							
2,4-DDT	6.9	0.8 U	4.22	0.8 U	0.79 U	0.79 U	0.4 U	2.4 J	2.5 J	4.5 J	2.3	10 J	0.8 UJ	6.4	6.1	15	8.1	2.8 J	
4,4-DDD	34 J	12 J	24.93	11	9 J	3.3 J	6.41	26 J	26 J	48	31 J	49	11 J	88	46	80 J	59 J	29 J	
4,4-DDE	30	11	22.17	10	35	10	23.66	26 J	26 J	50	49	57	13 J	140	52 J	58 J	56 J	29 J	
4,4-DDT	16	2.6 NJ	10.48	2.4	3.1 NJ	1.1 NJ	2.19	6.7 J	7.7 J	15 J	16 J	16 J	2.1 NJ	26 NJ	24 NJ	33 J	22 J	9.1 NJ	
Total DDT	96.8	27	68.03	24.8	50.5	14.4	34.12	65.9	65.9	124.5	100	143	26.1	272.4	136.1	210.1	162.3	74.5	
Aldrin	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
alpha-BHC	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
alpha-Chlordane	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 UJ	0.8 UJ	0.8 UJ	1 NJ	0.8 UJ	2.1 NJ	1.3 NJ	1.5	1.3	0.8 UJ	
beta-BHC	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
delta-BHC	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
Dieldrin	24	9.4	17.98	8.9	7	2.4	4.91	4.9 J	4.7 J	8.9	5.9	13 J	5 J	16	9 J	18	12	5.4 J	
Endosulfan I	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
Endosulfan II	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 UJ	0.8 U	0.8 U	0.8 UJ	0.8 UJ	0.8 U	0.8 U	0.79 U	0.8 U	0.8 UJ	
Endosulfan sulfate	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 UJ	0.8 U	0.8 U	0.8 UJ	0.8 UJ	0.8 U	0.8 U	0.79 U	0.8 U	0.8 UJ	
Endrin	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.82 NJ	0.8 UJ	1.1 NJ	0.8 U	2.4 NJ	1.1 J	2.8	1.7 NJ	1.7	1.2	0.8 UJ	
Endrin aldehyde	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
Gamma-BHC (Lindane)	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
gamma-Chlordane	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	1.1 NJ	1.2 NJ	1.7 NJ	1.7 NJ	0.99 NJ	0.8 UJ	1.8 NJ	4.5 NJ	2.6 NJ	2.6 NJ	1.4 NJ	
Heptachlor	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	0.79 U	0.8 U	0.8 UJ							
Heptachlor epoxide	0.83 NJ	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 U	2.7 NJ	3 NJ	0.8 UJ							
Methoxychlor	0.8 U	0.8 U	---	0.8 U	0.79 U	0.79 U	---	0.8 UJ	0.8 UJ	0.8 U	0.8 U	0.8 UJ	0.8 UJ	0.8 U	0.8 U	0.79 U	0.8 U	0.8 UJ	
Toxaphene	100 U	99 U	---	100 U	99 U	99 U	---	100 UJ	100 UJ	100 U	100 U	100 UJ	100 UJ	100 U	99 U	99 U	99 U	100 UJ	

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 6
 Results of Tissue Pesticides Santa Fe Channel Location 303.4
 United Heckathorn Superfund Site

Sample ID	3034-F-05-0508-F	3034-F-06-0508-F	3034-F-07-0508-F	3034-F-07-0508-FD
Percent Lipids	1.6	1.9	1.8	1.8
Sample Date	5/15/2008	5/15/2008	5/15/2008	5/15/2008
Species	Starry Flounder	Starry Flounder	Starry Flounder	Starry Flounder
Sample Type	composite	whole	whole	whole
Analyte	All Analytical Results in ug/kg			
Pesticides				
2,4-DDD	6	6.7 J	5.7	5.7
2,4-DDE	0.8 U	0.81 UJ	0.8 U	0.8 U
2,4-DDT	4.1 J	4.3 J	5.2	5.1
4,4-DDD	31 J	47 J	38	49 J
4,4-DDE	39	52 J	39	53 J
4,4-DDT	14 J	13 NJ	18	17
Total DDT	94.1	123	105.9	129.8
Aldrin	0.8 U	0.81 UJ	0.8 U	0.8 U
alpha-BHC	0.8 U	0.81 UJ	0.8 U	0.8 U
alpha-Chlordane	0.8 UJ	0.81 UJ	0.8 UJ	0.87 NJ
beta-BHC	0.8 U	0.81 UJ	0.8 U	0.8 U
delta-BHC	0.8 U	0.81 UJ	0.8 U	0.8 U
Dieldrin	8.5	9.7	6.2	6.2
Endosulfan I	0.8 U	0.81 UJ	0.8 U	0.8 U
Endosulfan II	0.8 U	0.81 U	0.8 U	0.8 U
Endosulfan sulfate	0.8 U	0.81 U	0.8 U	0.8 U
Endrin	0.8 U	0.81 U	0.8 U	0.8 U
Endrin aldehyde	0.8 UJ	0.81 UJ	0.8 UJ	0.8 UJ
Gamma-BHC (Lindane)	0.8 U	0.81 UJ	0.8 U	0.8 U
gamma-Chlordane	2.4 NJ	1.8 NJ	1.9	1.9 NJ
Heptachlor	0.8 U	0.81 UJ	0.8 U	0.8 U
Heptachlor epoxide	0.8 U	0.81 UJ	0.8 U	0.8 U
Methoxychlor	0.8 U	0.81 U	0.8 U	0.8 U
Toxaphene	100 U	100 U	100 U	100 U

Notes:

ug/kg: microgram per kilogram (ppb)
 D: Field duplicate
 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

Table 7
 Results of Tissue Pesticides Santa Fe Channel Location 303.6
 United Heckathorn Superfund Site

Sample ID	3036-F-01-0508-F	3036-F-02-0508-F	3036-F-03-0508-F	3036-F-04-0508-F	3036-F-05-0508-F	3036-F-06-0508-F	3036-F-07-0508-F	3036-F-07-0508-FD	3036-F-08-0508-F	3036-F-09-0508-F	3036-F-09-0508-FD	3036-F-10-0508-F	3036-F-11-0508-F
Percent Lipids	1.2	1.1	1.1	1.5	1.1	1.6	0.9	1.2	3.7	3.9	4.2	4.5	3.4
Sample Date	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008	5/15/2008
Species	Sculpin	Sculpin	Sculpin	Sculpin	Sculpin	Sculpin	Sculpin	Sculpin	Walleyed Perch	Walleyed Perch	Walleyed Perch	Walleyed Perch	Walleyed Perch
Sample Type	composite	composite	composite	composite	composite	whole	composite	composite	composite	composite	composite	composite	composite
Analyte	All Analytical Results in ug/kg												
Pesticides													
2,4-DDD	8.1	13	4.8	14	6.2	30	7.5	9.5	17	12	12	5.8	11
2,4-DDE	210 J	15 J	6.4 J	30 J	19 J	52 NJ	7.7	8.7	12	7.5	8.4	4.6	8
2,4-DDT	21	9.4	8.9	22	14	19	14	17	14	3.5	4.1	1.7	4.9
4,4-DDD	120	200	82	260	97	540	93	110	95	52	58	28	63
4,4-DDE	200 NJ	200	120	350	150	530	130	150	110	67	78	41	75
4,4-DDT	120 NJ	60	65	140	80	120 NJ	90	110	52 J	16	20 NJ	7.6 NJ	23 NJ
Total DDT	679.1	497.4	287.1	816	366.2	1291	345.1	405.2	300	158	180.5	88.7	184.9
Aldrin	0.79 U	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
alpha-BHC	0.79 U	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
alpha-Chlordane	2.6 NJ	2.3	1.7	2.6	1.8	4.5 NJ	2.4	2.8 NJ	3.2 NJ	2.4	2.5 NJ	2.3 NJ	2.6 NJ
beta-BHC	0.79 U	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
delta-BHC	0.79 U	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Dieldrin	9.8 NJ	15	6.5	17	7.6	32	7.7	9.3	19	15	16	9.1	14
Endosulfan I	1.2 NJ	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	1.1	1.5	0.89 NJ	1.2 NJ
Endosulfan II	0.79 U	0.8 U	0.79 U	0.8 NJ	0.8 U	2.3 NJ	0.8 U	0.79 U	0.96 NJ	0.8 U	0.8 U	0.8 U	0.8 U
Endosulfan sulfate	3.2 NJ	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.81	0.97 NJ	0.8 U	0.8 NJ
Endrin	3.4 NJ	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.97 NJ	0.8 U	0.81 NJ	0.8 U	0.8 U
Endrin aldehyde	2 NJ	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Gamma-BHC (Lindane)	0.79 U	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
gamma-Chlordane	8.9 NJ	1.9 NJ	1.2 NJ	5.2 NJ	1.4 NJ	21 NJ	3.2	3.8 NJ	5.2 J	3.7	3.9	2 NJ	4.4 J
Heptachlor	0.79 U	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Heptachlor epoxide	2.2 NJ	0.8 U	0.79 U	0.84 NJ	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Methoxychlor	1.5 NJ	0.8 U	0.79 U	0.79 U	0.8 U	1.6 U	0.8 U	0.79 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Toxaphene	99 U	100 U	99 U	99 U	100 U	200 U	100 U	99 U	100 U	100 U	100 U	100 U	100 U

Notes:

ug/kg: microgram per kilogram (ppb)
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 C: Calculated
 J: Estimated result
 NJ: Estimated and presumptively identified
 U: Not detected at reporting limit
 Total DDT is bolded

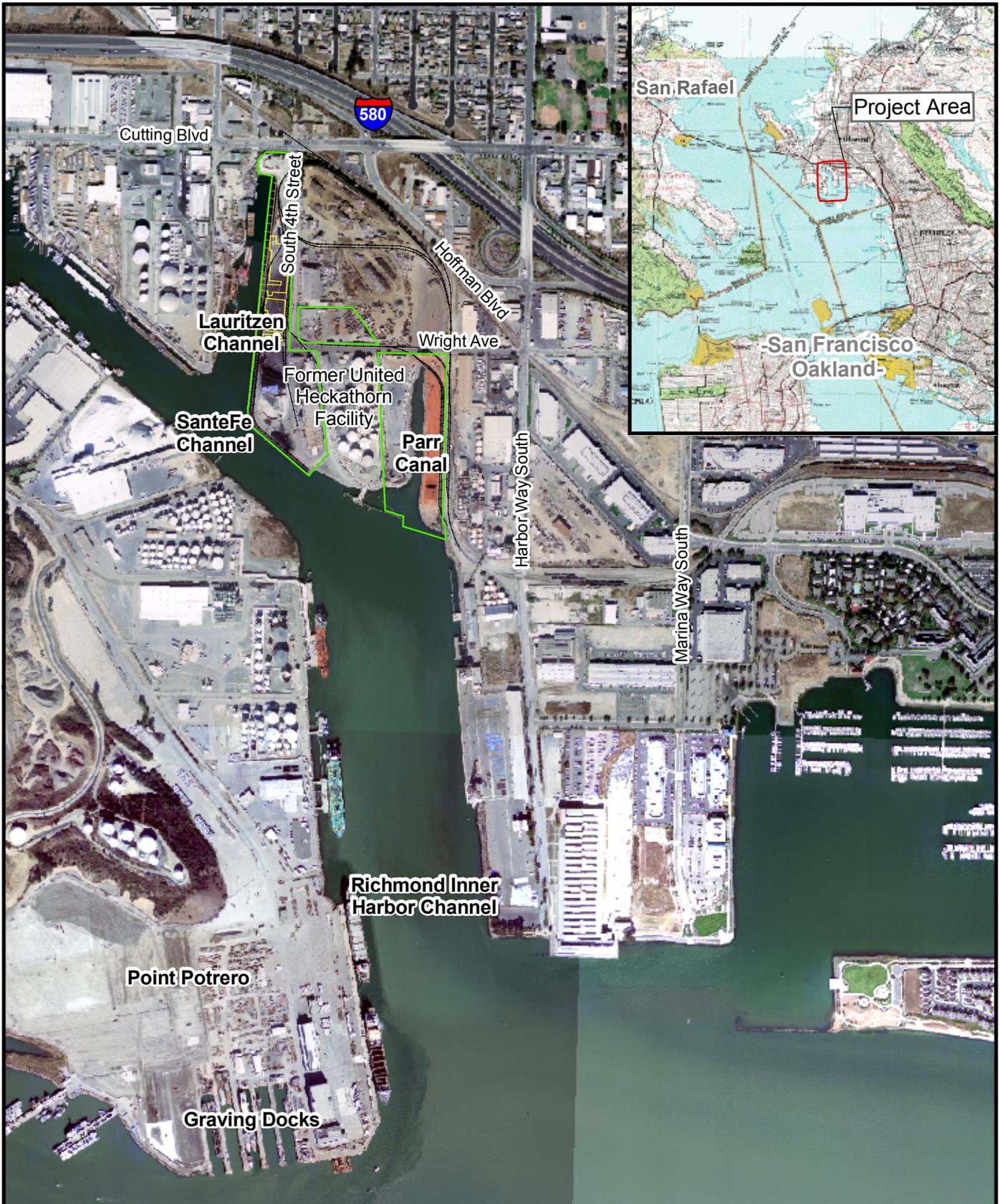
Table 1
SDG Sample Key

Sample ID	SDG	Species	size
3034-F-16-0508-F	125727	Bay Shrimp	16 X 1-3.5"
3034-F-17-0508-F	125727	Bay Shrimp	20 X 1"-2"
3034-F-18-0508-F	125727	Bay Shrimp	15 X 0.75"-1.5"
3034-F-19-0508-F	125727	Bay Shrimp	15 X 1"-2"
3034-F-20-0508-F	125727	Goby	0.75"-3"
3032-F-01-0508-F	125727	Anchovy	5 X 3"
3032-F-02-0508-F	125727	Anchovy	7 X 2.5"
3032-F-03-0508-F	125727	Anchovy	8 X 2.5"
3032-F-04-0508-F	125727	flounder/goby	18 X 1"-2" goby 1 X 2.5" flounder
3032-F-05-0508-F	125727	Sculpin	2 X 3.5"
3032-F-06-0508-F	125727	Bay Shrimp	13 X 1"- 2"
3032-F-07-0508-F	125727	Starry Flounder	4"
3031-F-01-0508-F	125727	Shiner Surfperch	6"
3031-F-02-0508-F	125727	Shiner Surfperch	4"
3031-F-03-0508-F	125727	Shiner Surfperch	4"
3034-F-01-0508-F	125727	Starry Flounder	4.5"
3034-F-02-0508-F	125727	Starry Flounder	4"
3034-F-03-0508-F	125727	Bay Shrimp	20 X 1"-2"
3034-F-04-0508-F	125728	Starry Flounder	4"
3034-F-05-0508-F	125728	Starry Flounder	2X4"
3034-F-06-0508-F	125728	Starry Flounder	4.5"
3034-F-07-0508-F	125728	Starry Flounder	5"
3034-F-08-0508-F	125728	Sculpin	1X3" 1X5"
3034-F-09-0508-F	125728	Sanddab	1X4" 1X2"
3034-F-10-0508-F	125728	Sanddab	2X3"
3034-F-11-0508-F	125728	Sanddab	1X2" 1X4"
3034-F-12-0508-F	125728	Shiner Surfperch	4"
3034-F-13-0508-F	125728	Shiner Surfperch	4"
3034-F-14-0508-F	125728	Shiner Surfperch	4"
3034-F-15-0508-F	125728	Bay Shrimp	14X1"-3"
3031-F-04-0508-F	125728	Shiner Surfperch	4"
3031-F-05-0508-F	125728	Sculpin	2X3.5"
3031-F-06-0508-F	125728	Sculpin	2X3.5" 1X4"
3031-F-07-0508-F	125728	Sanddab	4X3"
3031-F-08-0508	125728	Starry Flounder	1 X 8" carcass
3031-F-08-0508	125728	Starry Flounder	8" carcass
3031-F-08-0508-F	125728	Starry Flounder	8" fillet
3031-F-09-0508	125730	California Halibut	12" carcass
3031-F-09-0508-F	125730	California Halibut	12" fillet
3031-F-10-0508	125730	California Halibut	11" carcass
3031-F-10-0508-F	125730	California Halibut	11" fillet
3031-F-11-0508	125730	Starry Flounder	14.5" carcass
3031-F-11-0508-F	125730	Starry Flounder	14.5" fillet
3031-F-12-0508-F	125730	Shiner Surfperch	5"
3031-F-13-0508-F	125730	Shiner Surfperch	4.5"
3031-F-14-0508-F	125730	Shiner Surfperch	4.5"
3031-F-15-0508-F	125730	Shiner Surfperch	3" and 4"
3031-F-16-0508-F	125730	Bay Shrimp	20 X 0.75"-1.5"
3031-F-17-0508-F	125730	Bay Shrimp	25 X 0.75"-2"
3031-F-18-0508-F	125730	Anchovy	1"-2"
3031-F-19-0508-F	125730	Anchovy	1"-2"
3031-F-20-0508-F	125730	Anchovy	1"-2"

Table 1
SDG Sample Key

Sample ID	SDG	Species	size
3031-F-21-0508-F	125730	Anchovy	1"-2"
3033-F-01-0508-F	125730	Shiner Surfperch	4.5"
3033-F-02-0508-F	125730	Shiner Surfperch	4"
3033-F-03-0508-F	125733	Shiner Surfperch	2 X 3.5"
3033-F-04-0508-F	125733	Shiner Surfperch	3.5"
3033-F-05-0508-F	125733	Shiner Surfperch	2 X 3.5"
3033-F-06-0508-F	125733	Starry Flounder	5 X 1.5"-3"
3033-F-07-0508-F	125733	Sculpin	5"
3033-F-08-0508-F	125733	Sculpin	5" 3.5"
3033-F-09-0508-F	125733	Sculpin	3.5" 4.5"
3033-F-10-0508-F	125733	Sculpin	4 X 2.5"-3"
3033-F-11-0508-F	125733	Anchovy	43X1"-2"
3033-F-12-0508-F	125733	Anchovy	43X1"-2"
3033-F-13-0508-F	125733	Anchovy	43X1"-2"
3033-F-14-0508-F	125733	Anchovy	43X1"-2"
3033-F-15-0508-F	125733	Goby	1.25"-2.5"
3036-F-01-0508-F	125733	Sculpin	3 X 3"
3036-F-02-0508-F	125733	Sculpin	2 X 3" 1 X 3.5"
3036-F-03-0508-F	125733	Sculpin	4 X 2.5"
3036-F-04-0508-F	125733	Sculpin	4X2.5"
3036-F-05-0508-F	125733	Sculpin	3 X 2.5" 1X3"
3036-F-06-0508	125735	Sculpin	4"
3036-F-07-0508-F	125735	Sculpin	8 X 1.5"-2.5"
3036-F-08-0508	125735	Walleyed Perch	8 X 1.5"-2"
3036-F-09-0508-F	125735	Walleyed Perch	8 X 1.5" -2"
3036-F-10-0508	125735	Walleyed Perch	8 X 1.5"-2"
3036-F-11-0508-F	125735	Walleyed Perch	13 x 1.5"-2"
3033-F-16-0508	126115	Jacksmelt	8" carcass
3033-F-16-0508-F	126115	Jacksmelt	8" fillet
3033-F-17-0508	126115	Jacksmelt	10.25" carcass
3033-F-17-0508-F	126115	Jacksmelt	10.25" fillet
3033-F-18-0508	126115	Jacksmelt	10.25" carcass
3033-F-18-0508-F	126115	Jacksmelt	10.25" fillet
3033-F-19-0508	126115	Jacksmelt	10" carcass
3033-F-19-0508-F	126115	Jacksmelt	10" fillet
3033-F-20-0508	126115	Jacksmelt	12" carcass
3033-F-20-0508-F	126115	Jacksmelt	12" fillet
3034-F-21-0508	126115	Jacksmelt	7.75" carcass
3034-F-21-0508-F	126115	Jacksmelt	7.75" fillet
3034-F-22-0508	126115	Jacksmelt	10" carcass
3034-F-22-0508-F	126115	Jacksmelt	10" fillet
3034-F-23-0508	126115	Jacksmelt	10.5" carcass
3034-F-23-0508-F	126115	Jacksmelt	10.5" fillet
3034-F-24-0508	126115	Jacksmelt	8.5" carcass
3034-F-24-0508-F	126115	Jacksmelt	8.5" fillet
3034-F-25-0508	126116	Jacksmelt	10" carcass
3034-F-25-0508-F	126116	Jacksmelt	10" fillet
3034-F-26-0508	126116	Jacksmelt	9.5" carcass
3034-F-26-0508-F	126116	Jacksmelt	9.5" fillet

Figures



LEGEND

LRTC Property Line	Embankment Pier
Former United Heckathorn Buildings	Embankment Pilings

LRTC Property Line Source: 2003-2004 Annual Report for Storm Water Discharges Associated with Industrial Activities, LRTC

Aerial Source: USGS 2004

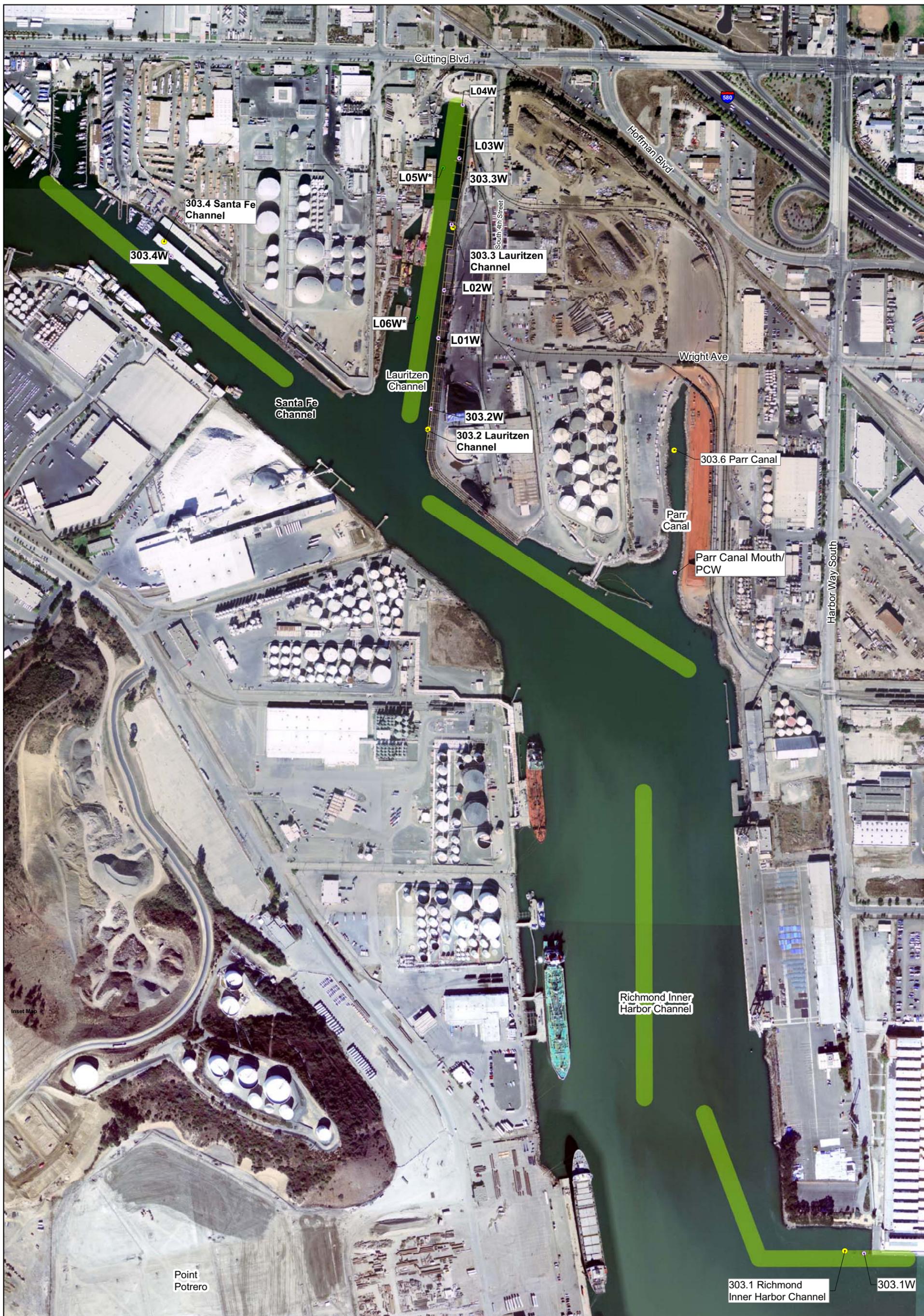
N

0 500 1,000

Feet

**FIGURE 1
PROJECT AREA**

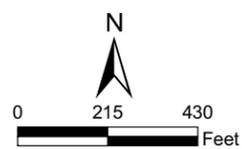
UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA



LEGEND

-  Embankment Pier
-  Historic Biomonitoring Water Sampling Locations
-  Embankment Pilings
-  Baseline 2007 Locations (mussel tissue, surface water, and surface sediment sample locations)
-  Trawl Path (Aprox 1500 ft)

Aerial Source: USGS 2004

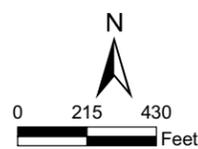


**FIGURE 2
PROPOSED FISH TRAWL
SAMPLE LOCATIONS**
UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA



LEGEND

-  Embankment Pier
-  Embankment Piling
-  Historic Biomonitoring Water Sampling Locations
-  Baseline 2007 Locations (mussel tissue, surface water, and surface sediment sample locations)
-  GPS Trawl Lines
-  Estimated Trawl Lines



**FIGURE 3
ACTUAL FISH TRAWL
SAMPLE LOCATIONS**

UNITED HECKATHORN SUPERFUND SITE
RICHMOND, CALIFORNIA

Attachment A:
Fish Chain-of-Custody Forms

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME		NO. OF CON-TAINERS	REMARKS							
	PROJ. NO.	PROJECT NAME									
340138	United Heckathorn										
SAMPLERS: (Signature) <i>Amara Jank</i> <i>CHM-Hill</i>											
DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE / TIME	RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE / TIME
5/15/08	1420	TIS			3034-f-16-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3034-f-17-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3034-f-18-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3034-f-19-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3034-f-20-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
5/15/08	1205	TIS			3032-f-01-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3032-f-02-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3032-f-03-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3032-f-04-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3032-f-05-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3032-f-06-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3032-f-07-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
5/15/08	1350	TIS			3031-f-01-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3031-f-02-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
					3031-f-03-0508-f	<i>[Signature]</i>	<i>[Signature]</i>		<i>[Signature]</i>	<i>[Signature]</i>	
Relinquished by: (Signature) <i>Amara Jank</i>					Date / Time	Received by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
Relinquished by: (Signature) <i>Amara Jank</i>					5/20/08	<i>[Signature]</i>	5/20/08	<i>[Signature]</i>			
Received for Laboratory by: (Signature)					Date / Time	Temp.	Seals Intact (Y/N)				
Conditions / Remarks					PO# 927807						

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME		NO. OF CONTAINERS	REMARKS															
	DATE	TIME																	
340138	United Heckathorn																		
SAMPLERS: (Signature) <i>Janna Jank CH2M Hill</i>																			
	DATE	TIME	MATRIX	COMP	GRAB	SAMPLE IDENTIFICATION													
	5/15/08	1530	TIS			3031-f-04-0508-f	X	X	X	X									
						3031-f-05-0508-f	X	X	X	X									
						3031-f-06-0508-f	X	X	X	X									
						3031-f-07-0508-f	X	X	X	X									
		1530				3031-f-08-0508	X	X	X	X									
		1530				3031-f-08-0508-f	X	X	X	X									
		1530				3031-f-09-0508	X	X	X	X									
						3031-f-09-0508-f	X	X	X	X									
						3031-f-10-0508	X	X	X	X									
						3031-f-10-0508-f	X	X	X	X									
						3031-f-11-0508	X	X	X	X									
						3031-f-11-0508-f	X	X	X	X									
						3031-f-12-0508-f	X	X	X	X									
	5/14/08	1030				3031-f-13-0508-f	X	X	X	X									
	5/14/08	1030				3031-f-13-0508-f	X	X	X	X									
	5/15/08	1030				3031-f-14-0508-f	X	X	X	X									
Relinquished by: (Signature) <i>Janna Jank</i>					Date / Time	Received by: (Signature)													
Relinquished by: (Signature)					5:20	14:20													
Received for Laboratory by: (Signature)					Date / Time	Received by: (Signature)													
Received for Laboratory by: (Signature)					Date / Time	Temp.	Seals Intact (Y/N)												
Conditions / Remarks					PO 927807					396									

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME		NO. OF CONTAINERS	REMARKS							
	PROJ. NO.	PROJECT NAME									
340138	United Heckerhorn										
SAMPLERS: (Signature) James Frank CH2M Hill											
DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	Relinquished by: (Signature)	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Received by: (Signature)	Date / Time
5/14/08	1440	TL5			3031-f-15-0508-f	X	X		X	X	
5/15/08	1550	TL5			3031-f-16-0508-f	X	X		X	X	
					3031-f-17-0508-f	X	X		X	X	
					3031-f-18-0508-f	X	X		X	X	
					3031-f-19-0508-f	X	X		X	X	
					3031-f-20-0508-f	X	X		X	X	
					3031-f-21-0508-f	X	X		X	X	
5/14/08	1440	TL5			3033-f-01-0508-f	X	X		X	X	
					3033-f-02-0508-f	X	X		X	X	
					3033-f-03-0508-f	X	X		X	X	
					3033-f-04-0508-f	X	X		X	X	
					3033-f-05-0508-f	X	X		X	X	
					3033-f-06-0508-f	X	X		X	X	
					3033-f-07-0508-f	X	X		X	X	
					3033-f-08-0508-f	X	X		X	X	
Relinquished by: (Signature) James Frank						Received by: (Signature)		Date / Time	Received by: (Signature)		
Relinquished by: (Signature)						Received by: (Signature)		5/20 1420	Received by: (Signature)		
Received for Laboratory by: (Signature)						Received by: (Signature)		Date / Time	Received by: (Signature)		
Conditions / Remarks						PO 927807		4/16			

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CONTAINERS	REMARKS	SAMPLE IDENTIFICATION			
				DATE	TIME	MATRIX	GRAB
340138	United Hecathorn						
SAMPLERS: (Signature) Janale Hank							
CMM (HCL)							
				3033-f-09-0508-f			
				3033-f-10-0508-f			
				3033-f-11-0508-f			
				3033-f-12-0508-f			
				3033-f-13-0508-f			
				3033-f-14-0508-f			
				3033-f-15-0508-f			
				3036-f-1-0508-f			
				3036-f-2-0508-f			
				3036-f-03-0508-f			
				3036-f-04-0508-f			
				3036-f-05-0508-f			
				3036-f-06-0508-f			
				3036-f-07-0508-f			
				3036-f-08-0508-f			
Relinquished by: (Signature) Janale Hank				Received by: (Signature)			
Date / Time				Date / Time			
5/20/14							
Relinquished by: (Signature)				Received by: (Signature)			
Date / Time				Date / Time			
Received for Laboratory by: (Signature)				Seals Intact (Y/N)			
Date / Time				Temp.			
Conditions / Remarks				Relinquished by: (Signature)			
p 927807				Date / Time			
				Received by: (Signature)			
				Date / Time			

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CONTAINERS	REMARKS	Received by: (Signature)		Date / Time	
				Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
340138	United Healthcare						
SAMPLERS: (Signature)				Date / Time		Date / Time	
James Jank				6/19/08 1400			
DATE	MATRIX	COMP	GRAB	SAMPLE IDENTIFICATION			
6/19/08 1100	715			3033-F-16-0508			
				3033-F-16-0508-F			
				3033-F-17-0508			
				3033-F-17-0508-F			
				3033-F-18-0508			
				3033-F-18-0508-F			
				3033-F-19-0508			
				3033-F-19-0508-F			
				3033-F-20-0508			
				3033-F-20-0508-F			
				3034-f-21-0508			
				3034-f-21-0508-F			
				3034-f-22-0508			
				3034-f-22-0508-F			
				3034-f-23-0508			
				3034-f-23-0508-F			
Relinquished by: (Signature)				Received by: (Signature)		Date / Time	
James Jank						6/19/08 1400	
Relinquished by: (Signature)				Received by: (Signature)		Date / Time	
Received for Laboratory by: (Signature)				Temp.		Seals Intact (Y/N)	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

PO# 927807

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Attachment B:
Tier 3 Validation Reports



ICF International / Laboratory Data Consultants
Environmental Services Assistance Team, Region 9
1337 South 46th Street, Building 201, Richmond, CA 94804-4698
Phone: (510) 412-2300; Fax: (510) 412-2304.

MEMORANDUM

TO: Sharon Lin, Remedial Project Manager
Site Cleanup Section 2, SFD-7-2

THROUGH: Rose Fong, ESAT Task Order Manager (TOM)
Quality Assurance (QA) Program, MTS-3

FROM: Doug Lindelof, Data Review Task Manager
Region 9 Environmental Services Assistance Team (ESAT)

ESAT Contract No.: EP-W-06-041
Technical Direction Form No.: 00405016 Amendment 2

DATE: August 15, 2008

SUBJECT: Review of Analytical Data, **Tier 2**

Attached are comments resulting from ESAT Region 9 review of the following analytical data:

Site:	United Heckathorn
Site Account No.:	09 R3 QB01
CERCLIS ID No.:	CAD981436363
Case No.:	Not Provided
SDG No.:	125727
Laboratory:	TestAmerica
Analysis:	Organochlorine Pesticides
Samples:	18 Tissue Samples (see Case Summary)
Collection Date:	May 15, 2008
Reviewer:	Santiago Lee, ESAT/Laboratory Data Consultants

This report has been reviewed by the EPA TOM for the ESAT contract, whose signature appears above.

If there are any questions, please contact Rose Fong (QA Program/EPA) at (415) 972-3812.

Attachment

SAMPLING ISSUES: Yes No

Data Validation Report - Tier 2

Case No.: Not Provided
SDG No.: 125727
Site: United Heckathorn
Laboratory: TestAmerica
Reviewer: Santiago Lee, ESAT/LDC
Date: August 15, 2008

I. CASE SUMMARY

Sample Information:

Samples: 3034-F-16-0508-F through 3034-F-20-0508-F, 3032-F-01-0508-F through 3032-F-07-0508-F, 3031-F-01-0508-F through 3031-F-03-0508-F, and 3034-F-1-0508-F through 3034-F-3-0508-F
Concentration and Matrix: Tissue
Analysis: Organochlorine Pesticides
Method: SW-846 Method 8081A
Collection Date: May 15, 2008
Sample Receipt Date: May 21, 2008
Extraction Date: June 25, 2008 and July 14, 2008
Analysis Date: July 8 and 18, 2008

Field QC:

Field Blanks (FB): Not Provided
Equipment Blanks (EB): Not Provided
Background Samples (BG): Not Provided
Field Duplicates (D1): Not Provided

Laboratory QC

Method Blanks & Associated Samples:
MBLK062508B: All samples except 3032-F-01-0508-F, 3032-F-03-0508-FMS, 3032-F-03-0508-FMSD, 3032-F-07-0508-FD, 3031-F-01-0508-FD, EQBLK01, and laboratory control sample (LCS) B062508LCS
MBLK062508B: 3032-F-01-0508-F and LCS B071408LCS

Tables

1B: Data Qualifier Definitions for Organic Data Review
2: Analyte Concentration Summary

Sampling Issues

None.

Additional Comments

As directed by the TOM, Tier 3-level validation of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, 2,4'-DDD, and dieldrin and Tier 1A forms review on the remaining analytes were performed.

Recoveries of methoxychlor (76.9%) and endrin aldehyde (79.7%) for 07/07/08 initial calibration verification on the RTX-CLP column exceeded the laboratory QC limit of 80-120%. Since recoveries are only slightly below the QC limit, no adverse effect is expected.

For duplicate pairs 3031-F-01-0508-F/3031-F-01-0508-FD and 3032-F-07-0508-F/3032-F-07-0508-FD, results for 3031-F-01-0508-FD and 3032-F-07-0508-FD are validated and reported in Table 1A since they have higher surrogate recoveries (see attached Form 2s, pp. 70 and 71 in data package).

The laboratory reported the lower result generated by the two columns, on a wet weight basis, on the Form 1s; results below the reporting limit were not reported (see attached Case Narrative, seventh paragraph on p. 1.3 in data package).

The laboratory generated an "equipment blank", identified as "EBLK01", in order to characterize the homogenization process (see attached Case Narrative, third paragraph on p. 1.2 in data package).

This report was prepared in accordance with the following documents:

- X ESAT Region 9 Standard Operating Procedure 902, *Guidelines for Data Review of Contract Laboratory Program Analytical Services (CLPAS) Pesticide/PCB Data Packages*;
- X SW-846 Method 8081A, *Organochlorine Pesticides by Gas Chromatography*, Revision 1, December 1996; and
- X USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, July 2007.

II. VALIDATION SUMMARY

The data were evaluated based on the following parameters:

	<u>Parameter</u>	<u>Acceptable</u>	<u>Comment</u>
1.	Holding Time/Preservation	Yes	
2.	GC Performance	Yes	
3.	Initial Calibration	Yes	
4.	Continuing Calibration	No	D
5.	Laboratory Blanks	Yes	
6.	Field Blanks	N/A	

7.	Surrogates	Yes	
8.	Matrix Spike/Matrix Spike Duplicates	No	F
9.	Laboratory Control Samples/Duplicates	No	E
10.	Compound Identification	No	A, B
11.	Compound Quantitation	No	A, B, C, G
12.	System Performance	Yes	
13.	Field Duplicate Sample Analysis	N/A	

N/A = Not Applicable

III. VALIDITY AND COMMENTS

A. Detected results for the following analytes are considered presumptively identified and estimated due to confirmation problems and are flagged "NJ" in Table 1A.

- X 4,4'-DDT, endrin aldehyde, gamma-chlordane, and alpha-chlordane in sample 3031-F-01-0508-FD
- X 4,4'-DDT in sample 3032-F-07-0508-FD
- X Endrin, 4,4'-DDT, alpha-chlordane, and 2,4'-DDT in sample 3032-F-03-0508-F
- X 4,4'-DDT, alpha-chlordane, and 2,4'-DDD in sample 3032-F-01-0508-F
- X Endosulfan I, 4,4'-DDT, and alpha-chlordane in sample 3032-F-02-0508-F
- X Dieldrin, endrin, and gamma-chlordane in sample 3032-F-04-0508-F
- X 4,4'-DDT in sample 3034-F-18-0508-F
- X Dieldrin and 4,4'-DDT in sample 3034-F-19-0508-F
- X 4,4'-DDT, gamma-chlordane, and alpha-chlordane in sample 3031-F-02-0508-F
- X Endosulfan sulfate, 4,4'-DDT, and alpha-chlordane in sample 3031-F-03-0508-F
- X 4,4'-DDT, gamma-chlordane, and alpha-chlordane in sample 3032-F-05-0508-F
- X Endrin, 4,4'-DDT, gamma-chlordane, and alpha-chlordane in sample 3034-F-1-0508-F
- X 2,4'-DDD in sample 3034-F-16-0508-F
- X 4,4'-DDT and gamma-chlordane in sample 3034-F-20-0508-F
- X gamma-Chlordane in samples 3034-F-2-0508-F and 3034-F-3-0508-F

The percent differences (%D) in calculated concentrations between the RTX-CLP column and the RTX-CLP2 column ($\text{concentration}_a - \text{concentration}_b / \text{average concentration}$) exceeded the validation QC limit of 25.0% for analytes listed above (see Table 2).

The laboratory reported the lower concentrations and they are presented in Table 1A. It is the opinion of the reviewer that, due to the large %Ds between results quantitated from the two columns, it is questionable whether the presence of the

analytes listed above can be considered confirmed in the samples. Data users should note that these results are both qualitatively and quantitatively questionable.

- B. Detected results for the following analyte are considered presumptively identified and estimated due to resolution problems and are flagged ANJ@ in Table 1A.

X Heptachlor epoxide in samples 3032-F-03-0508-F, 3034-F-2-0508-F, and 3034-F-3-0508-F

For the column RTX-CLP, heptachlor epoxide co-eluted with 2,4'-DDE. Consequently, all heptachlor epoxide detected results in Table 1A were reported from the RTX-CLPII column. Data users should note that results for heptachlor epoxide in samples listed above are both qualitatively and quantitatively questionable.

- C. Detected results for the following analyte are qualified as estimated due to resolution problems and are flagged AJ@ in Table 1A.

X 2,4'-DDE in sample 3032-F-01-0508-F, 3032-F-03-0508-F, 3034-F-2-0508-F, and 3034-F-3-0508-F

For the column RTX-CLP, 2,4'-DDE co-eluted with heptachlor epoxide. Consequently, all 2,4'-DDE detected results for samples listed above were reported from the RTX-CLPII column. It is the reviewer's opinion that 2,4'-DDE is present in samples listed above because 2,4'-DDD, 2,4'-DDT, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT are also found in the samples.

- D. Results for the following analytes are qualified as estimated due to large percent differences (%Ds) in continuing calibration verifications (CCVs) and are flagged AJ@ or "UJ" in Table 1A.

X 4,4'-DDE and 4,4'-DDD in sample 3034-F-17-0508-F

X 4,4'-DDD in samples 3034-F-16-0508-F, 3034-F-18-0508-F, 3034-F-19-0508-F, and 3034-F-20-0508-FDL

X 4,4'-DDE in sample 3034-F-16-0508-FDL

X Dieldrin, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT in sample 3031-F-01-0508-FD

X Dieldrin and 4,4'-DDT in sample 3031-F-02-0508-F

X Dieldrin, 4,4'-DDE, and 4,4'-DDT in sample 3031-F-03-0508-F

X Dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and gamma-chlordane in sample 3032-F-04-0508-F

X Dieldrin, 4,4'-DDE, 4,4'-DDT, and gamma-chlordane in sample 3032-F-05-0508-F

X 4,4'-DDT in sample 3032-F-06-0508-F

X 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT in sample 3032-F-07-0508-FD

X Dieldrin, 4,4'-DDE, 4,4'-DDT, and gamma-chlordane in sample 3034-F-1-0508-F

- X 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and gamma-chlordane in samples 3034-F-2-0508-F and 3034-F-3-0508-F

%Ds for 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT on RTX-CLPII column exceeded the $\pm 15\%$ method criterion for 07/08/08 02:47 and 23:07 CCVs (see attached Form 7s; pp. 484 and 487 in data package). For 07/08/08 16:36 and 23:07 CCVs, %Ds for several analytes on RTX-CLP column exceeded the $\pm 15\%$ method criterion (see attached Form 7s; pp. 480 and 481 in data package). For analytes with %Ds exceeding criterion on one column only, detected results reported from that column are qualified as estimated. For analytes with %Ds exceeding criterion on both columns, detected and nondetected results are qualified as estimated. Qualified detected results may be biased high.

The continuing calibration verification checks and documents satisfactory performance of the instrument over specific time periods during sample analysis.

- E. Results for the following analytes are qualified as estimated due to low laboratory control sample (LCS) recoveries and are flagged AJ@ or "UJ" in Table 1A.

- X delta-BHC, endosulfan sulfate, and endrin aldehyde in sample 3032-F-01-0508-F

Recoveries of 47%, 46%, and 42% were reported for delta-BHC, endosulfan sulfate, and endrin aldehyde, respectively, in the LCS B071408LCS. These values are below the laboratory QC limit of 50-150%. Since qualified results are nondetected, false negatives may exist. Sample 3032-F-01-0508-F was not re-extracted.

Data for LCSs are generated to provide information on the accuracy of the analytical method and laboratory performance.

- F. Matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent differences (RPDs) for aldrin, 4,4'-DDE, endrin, 4,4'-DDD, and endrin aldehyde in QC samples 3032-F-03-0508-FMS and 3032-F-03-0508-FMSD were outside laboratory QC limits (see attached Form 3s; pp. 72 and 73 in data package). Results reported may indicate poor laboratory technique or matrix effects which may interfere with analysis. Endrin recoveries of -30% and -5% were reported for 3032-F-03-0508-FMS and 3032-F-03-0508-FMSD, respectively. The laboratory stated in the Case Narrative that "The values for endrin may reflect a possible interference in the derived result for endrin in the analysis of the parent sample." (see attached Case Narrative, fourth paragraph on p. 1.2 in data package). The effects on data quality are not known.

Matrix spike sample analysis provides information about the effect of the sample matrix on sample preparation and measurement.

- G. Samples 3031-F-02-0508-F and 3034-F-16-0508-F were reanalyzed at 2-fold dilutions due to high levels of 4,4'-DDE that exceeded the calibration range. Results of 4,4'-DDE in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Samples 3031-F-03-0508-F, 3034-F-01-0508-F, and 3034-F-3-0508-F were reanalyzed at 2-, 2-, and 3-fold dilutions, respectively, due to high levels of 4,4'-DDE and 4,4'-DDD that exceeded the calibration range. Results of 4,4'-DDE and 4,4'-DDD in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Samples 3032-F-05-0508-F and 3034-F-20-0508-F were reanalyzed at 2-fold dilutions due to high levels of 4,4'-DDD that exceeded the calibration range. Results of 4,4'-DDD in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Sample 3034-F-2-0508-F was reanalyzed at a 3-fold dilution due to high levels of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT that exceeded the calibration range. Results of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT in sample 3034-F-2-0508-F are reported from the diluted analysis in Table 1A; results for other analytes are reported from the undiluted analysis.

TABLE 1B

DATA QUALIFIER DEFINITIONS FOR ORGANIC DATA REVIEW

The definitions of the following qualifiers are prepared according to the document, "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," July 2007.

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
- L Indicates results which fall below the Contract Required Quantitation Limit. Results are estimated and are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.
- J The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- R The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

TABLE 2
Analyte Concentration Summary

Case No.: Not Provided
 SDG No.: 125727
 Site: United Heckathorn
 Laboratory: TestAmerica
 Reviewer: Santiago Lee, ESAT/LDC
 Date: August 15, 2008

<u>Sample</u>	<u>Analyte</u>	<u>Column RTX-CLP Conc., µg/Kg</u>	<u>Column RTX-CLPII Conc., µg/Kg</u>	<u>%D</u>
3031-F-01-0508-FD	4,4'-DDT	4.6	16	110
	Endrin aldehyde	3.4	0.87	120
	gamma-Chlordane	4.1	2.6	45
	alpha-Chlordane	3.7	2.6	35
3032-F-07-0508-FD	4,4'-DDE	2.1	2.8	29
3032-F-03-0508-F	Endrin	26	20	26
	4,4'-DDT	2.7	7.2	91
	alpha-Chlordane	2.3	1.5	42
	2,4'-DDT	1.6	1.2	29
3032-F-01-0508-F	4,4'-DDT	2.9	7.6	90
	alpha-Chlordane	2.2	1.3	51
	2,4'-DDD	3.3	2.4	32
3032-F-02-0508-F	Endosulfan I	1.1	1.6	37
	4,4'-DDT	2.3	7.5	110
	alpha-Chlordane	2.5	1.8	33
3032-F-04-0508-F	Dieldrin	3.4	4.5	28
	Endrin	2.9	2.2	27
	gamma-Chlordane	1.1	2.8	87
3034-F-18-0508-F	4,4'-DDT	3.5	4.6	27
3034-F-19-0508-F	Dieldrin	1.5	19	170
	4,4'-DDT	3.8	24	150
3031-F-02-0508-F	4,4'-DDT	6.2	15	83
	gamma-Chlordane	3.4	2.2	43
	alpha-Chlordane	2.4	1.8	29
3031-F-03-0508-F	Endosulfan sulfate	0.88	4.6	140
	4,4'-DDT	8.8	22	86
	alpha-Chlordane	3.3	2.4	32
3032-F-05-0508-F	4,4'-DDT	8.8	13	39
	gamma-Chlordane	2.0	3.2	46
	alpha-Chlordane	1.7	1.1	43
3034-F-1-0508-F	Endrin	2.2	1.7	26
	4,4'-DDT	24	38	45
	gamma-Chlordane	4.5	5.9	27
	alpha-Chlordane	1.7	1.3	27
3034-F-16-0508-F	2,4'-DDD	1.5	2.3	42

<u>Sample</u>	<u>Analyte</u>	Column RTX-CLP <u>Conc., µg/Kg</u>	Column RTX-CLPII <u>Conc., µg/Kg</u>	<u>%D</u>
3034-F-20-0508-F	4,4'-DDT	12	16	29
	gamma-Chlordane	1.4	3.5	86
3034-F-2-0508-F	gamma-Chlordane	2.6	9.6	110
3034-F-3-0508-F	gamma-Chlordane	2.6	7.0	92



ICF International / Laboratory Data Consultants

Environmental Services Assistance Team, Region 9
1337 South 46th Street, Building 201, Richmond, CA 94804-4698
Phone: (510) 412-2300; Fax: (510) 412-2304.

MEMORANDUM

TO: Sharon Lin, Remedial Project Manager
Site Cleanup Section 2, SFD-7-2

THROUGH: Rose Fong, ESAT Task Order Manager (TOM)
Quality Assurance (QA) Program, MTS-3

FROM: Doug Lindelof, Data Review Task Manager
Region 9 Environmental Services Assistance Team (ESAT)

ESAT Contract No.: EP-W-06-041
Technical Direction Form No.: 00405016 Amendment 2

DATE: August 19, 2008

SUBJECT: Review of Analytical Data, **Tier 2**

Attached are comments resulting from ESAT Region 9 review of the following analytical data:

Site:	United Heckathorn
Site Account No.:	09 R3 QB01
CERCLIS ID No.:	CAD981436363
Case No.:	Not Provided
SDG No.:	125728
Laboratory:	TestAmerica
Analysis:	Organochlorine Pesticides
Samples:	18 Tissue Samples (see Case Summary)
Collection Date:	May 15, 2008
Reviewer:	Santiago Lee, ESAT/Laboratory Data Consultants (LDC)

This report has been reviewed by the EPA TOM for the ESAT contract, whose signature appears above.

If there are any questions, please contact Rose Fong (QA Program/EPA) at (415) 972-3812.

Attachment

SAMPLING ISSUES: Yes No

Data Validation Report - Tier 2

Case No.: Not Provided
SDG No.: 125728
Site: United Heckathorn
Laboratory: TestAmerica
Reviewer: Santiago Lee, ESAT/LDC
Date: August 19, 2008

I. CASE SUMMARY

Sample Information:

Samples: 3034-F-4-0508-F through 3034-F-15-0508-F, 3031-F-04-0508-F through 3031-F-07-0508-F, 3031-F-08-0508, and 3031-F-08-0508-F
Concentration and Matrix: Tissue
Analysis: Organochlorine Pesticides
Method: SW-846 Method 8081A
Collection Date: May 15, 2008
Sample Receipt Date: May 21, 2008
Extraction Date: June 25, 2008 and July 14, 2008
Analysis Date: July 8 and 18, 2008

Field QC:

Field Blanks (FB): Not Provided
Equipment Blanks (EB): Not Provided
Background Samples (BG): Not Provided
Field Duplicates (D1): Not Provided

Laboratory QC

Method Blanks & Associated Samples:

MBLK062508B: All samples, 3031-F-08-0508-FMS, 3031-F-08-0508-FMSD, 3034-F-07-0508-FD, 3031-F-08-0508-FD, EQBLK02, and laboratory control sample (LCS) F062708LCS

Tables

1B: Data Qualifier Definitions for Organic Data Review
2: Analyte Concentration Summary

Sampling Issues

None.

Additional Comments

As directed by the TOM, Tier 3-level validation of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, 2,4'-DDD, and dieldrin and Tier 1A forms review on the remaining analytes were performed.

For the column RTX-CLP, heptachlor epoxide co-eluted with 2,4'-DDE. No data are qualified since heptachlor epoxide and 2,4'-DDE are not detected in the samples.

For 07/07/08 and 07/22/08 initial calibration verifications on the RTX-CLP column, recoveries of methoxychlor (76.9% and 77.4%, respectively) and endrin aldehyde (79.7% and 79.3%, respectively) exceeded the laboratory QC limit of 80-120%. Since recoveries are only slightly below the QC limit, no adverse effect on data quality is expected.

For duplicate pairs 3034-F-7-0508-F/3034-F-7-0508-FD and 3031-F-08-0508/3031-F-08-0508-D, results for 3034-F-7-0508-FD and 3031-F-08-0508-D are validated and reported in Table 1A since they have higher surrogate recoveries (see attached Form 2s, pp. 70 and 71 in data package).

The laboratory reported the lower result generated by the two columns, on a wet weight basis, on the Form 1s; results below the reporting limit were not reported (see attached Case Narrative, sixth paragraph on p. 1.3 in data package).

The laboratory generated an "equipment blank", identified as "EBLK02", in order to characterize the homogenization process (see attached Case Narrative, third paragraph on p. 1.2 in data package).

This report was prepared in accordance with the following documents:

- X ESAT Region 9 Standard Operating Procedure 902, *Guidelines for Data Review of Contract Laboratory Program Analytical Services (CLPAS) Pesticide/PCB Data Packages*;
- X SW-846 Method 8081A, *Organochlorine Pesticides by Gas Chromatography*, Revision 1, December 1996; and
- X USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, July 2007.

II. VALIDATION SUMMARY

The data were evaluated based on the following parameters:

	<u>Parameter</u>	<u>Acceptable</u>	<u>Comment</u>
1.	Holding Time/Preservation	Yes	
2.	GC Performance	Yes	
3.	Initial Calibration	Yes	
4.	Continuing Calibration	No	B
5.	Laboratory Blanks	Yes	
6.	Field Blanks	N/A	
7.	Surrogates	No	D
8.	Matrix Spike/Matrix Spike Duplicates	No	E
9.	Laboratory Control Samples/Duplicates	No	C
10.	Compound Identification	No	A
11.	Compound Quantitation	No	A, F
12.	System Performance	Yes	
13.	Field Duplicate Sample Analysis	N/A	

N/A = Not Applicable

III. VALIDITY AND COMMENTS

A. Detected results for the following analytes are considered presumptively identified and estimated due to confirmation problems and are flagged "NJ" in Table 1A.

- X 4,4'-DDT in samples 3031-F-08-0508-F, 3031-F-05-0508-F, 3031-F-06-0508-F, 3031-F-08-0508-D, and 3034-F-13-0508-F
- X 4,4'-DDT, gamma-chlordane, and alpha-chlordane in sample 3031-F-04-0508-F
- X Endrin and 4,4'-DDT in sample 3031-F-07-0508-F
- X gamma-chlordane in samples 3034-F-10-0508-F, 3034-F-5-0508-F, and 3034-F-8-0508-F
- X 4,4'-DDT and gamma-chlordane in sample 3034-F-4-0508-F
- X Endrin and gamma-chlordane in samples 3034-F-9-0508-F and 3034-F-11-0508-F
- X Endrin, gamma-chlordane, and alpha-chlordane in sample 3034-F-12-0508-F
- X 4,4'-DDT, gamma-chlordane, and alpha-chlordane in sample 3034-F-14-0508-F
- X 4,4'-DDT and gamma-chlordane in sample 3034-F-6-0508-F
- X Gamma-chlordane and alpha-chlordane in sample 3034-F-7-0508-FD

The percent differences (%D) in calculated concentrations between the RTX-CLP column and the RTX-CLP2 column ($\text{concentration}_a - \text{concentration}_b / \text{average concentration}$) exceeded the validation QC limit of 25.0% for analytes listed above (see Table 2).

The laboratory reported the lower concentrations and they are presented in Table 1A. It is the opinion of the reviewer that, due to the large %Ds between results quantitated from the two columns, it is questionable whether the presence of the analytes listed above can be considered confirmed in the samples. Data users should note that these results are both qualitatively and quantitatively questionable.

- B. Results for the following analytes are qualified as estimated due to large percent differences (%Ds) in continuing calibration verifications (CCVs) and are flagged AJ@ or “UJ” in Table 1A.

- X 4,4'-DDD, 4,4'-DDT, and gamma-chlordane in samples 3034-F-8-0508-F
- X 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and gamma-chlordane in samples 3034-F-9-0508-F and 3034-F-10-0508-F
- X 4,4'-DDT and gamma-chlordane in samples 3034-F-11-0508-F, 3034-F-12-0508-F, and 3034-F-14-0508-F
- X 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT in samples 3034-F-13-0508-F, 3034-F-15-0508-F, and 3031-F-04-0508-F
- X Dieldrin, 4,4'-DDE, 4,4'-DDT, gamma-chlordane, and 2,4'-DDT in sample 3034-F-4-0508-F
- X 4,4'-DDT and gamma-chlordane, and 2,4'-DDT in sample 3034-F-5-0508-F
- X 4,4'-DDE, 4,4'-DDD, 4,4'-DDT and gamma-chlordane, and 2,4'-DDT in sample 3034-F-6-0508-F
- X 4,4'-DDE and 4,4'-DDD in sample 3034-F-7-0508-FDDL
- X 4,4'-DDD in sample 3034-F-5-0508-FDL

%Ds for some analytes exceeded the $\pm 15\%$ method criterion for CCVs on columns RTX-CLP and RTX-CLPII (see attached Form 7s; pp. 483, 484, 488, 490, 494, and 497 in data package). For analytes with %Ds exceeding criterion on one column only, detected results reported from that column are qualified as estimated. For analytes with %Ds exceeding criterion on both columns, detected and nondetected results are qualified as estimated. Qualified detected results may be biased high.

The continuing calibration verification checks and documents satisfactory performance of the instrument over specific time periods during sample analysis.

- C. Results for the following analytes are qualified as estimated due to low laboratory control sample (LCS) recoveries and are flagged AJ@ or “UJ” in Table 1A.

- X Endrin aldehyde and alpha-chlordane in all samples

Recoveries of 44% were reported for endrin aldehyde and alpha-chlordane in the LCS F062708LCS. These values are below the laboratory QC limit of 50-150%. Qualified detected results may be biased low. Where qualified results are nondetected, false negatives may exist. The samples were not re-extracted.

Data for LCSs are generated to provide information on the accuracy of the analytical method and laboratory performance.

D. Results for the following analytes are qualified as estimated due to surrogate recoveries below QC limits and are flagged AJ@ or “UJ” in Table 1A.

- X All analytes in samples 3034-F-4-0508-F, 3034-F-9-0508-F, 3034-F-10-0508-F, 3034-F-12-0508-F, 3034-F-13-0508-F, 3034-F-15-0508-F, and 3031-F-05-0508-F through 3031-F-08-0508-F
- X alpha-BHC, beta-BHC, delta-BHC, gamma-BHC, aldrin, heptachlor, heptachlor epoxide, endosulfan I, and 2,4'-DDE in samples 3034-F-6-0508-F, 3034-F-8-0508-F, 3034-F-11-0508-F, 3034-F-14-0508-F, and 3031-F-08-0508-D
- X Dieldrin and 2,4'-DDD in sample 3034-F-6-0508-F
- X 4,4'-DDE and 4,4'-DDD in sample 3034-F-6-0508-FDL
- X 2,4'-DDD in sample 3034-F-8-0508-F
- X Dieldrin, Endrin, 2,4'-DDD, and 2,4'-DDT in sample 3034-F-11-0508-F

Many surrogate recoveries were below the QC limits (see attached Form 2, pp. 70 and 71 in data package). For samples with surrogate recoveries below QC limit on one column only, detected results reported from that column are qualified as estimated. For samples with surrogate recoveries below QC limit on both columns, detected and nondetected results are qualified as estimated. Qualified detected results may be biased low. Where qualified results are nondetected, false negatives may exist. The samples were not re-extracted.

Surrogates are organic compounds which are similar to the target analytes in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples. All samples are spiked with surrogates prior to extraction. Surrogates provide information about both the laboratory performance on individual samples and the possible effects of the sample matrix on the analytical results.

E. Matrix spike/matrix spike duplicate (MS/MSD) recoveries for endrin aldehyde and alpha-chlordane in QC samples 3031-F-08-0508-FMS and 3031-F-08-0508-FMSD were outside laboratory QC limits (see attached Form 3s; pp. 72 and 73 in data package). Results reported may indicate poor laboratory technique or matrix effects which may interfere with analysis. Since endrin aldehyde and alpha-chlordane in sample 3031-F-08-0508-F are nondetected, false negatives may exist. The effects on data quality for other samples are not known.

Matrix spike sample analysis provides information about the effect of the sample matrix on sample preparation and measurement.

F. Samples 3034-F-11-0508-F, 3034-F-12-0508-F, 3034-F-14-0508-F, 3034-F-5-0508-F, 3034-F-6-0508-F, and 3034-F-7-0508-FD were reanalyzed at 2-, 2-, 5-, 2-, 2-, and

2-fold dilutions, respectively, due to high levels of 4,4'-DDD and 4,4'-DDE and that exceeded the calibration range. Results of 4,4'-DDD and 4,4'-DDE in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Sample 3034-F-8-0508-F was reanalyzed at a 3-fold dilution due to a high level of 4,4'-DDE that exceeded the calibration range. The result of 4,4'-DDE in sample 3034-F-11-0508-F is reported from the diluted analysis in Table 1A; results for other analytes are reported from the undiluted analysis.

TABLE 1B

DATA QUALIFIER DEFINITIONS FOR ORGANIC DATA REVIEW

The definitions of the following qualifiers are prepared according to the document, "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," July 2007.

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
- L Indicates results which fall below the Contract Required Quantitation Limit. Results are estimated and are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.
- J The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- R The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

TABLE 2
Analyte Concentration Summary

Case No.: Not Provided
 SDG No.: 125728
 Site: United Heckathorn
 Laboratory: TestAmerica
 Reviewer: Santiago Lee, ESAT/LDC
 Date: August 15, 2008

<u>Sample</u>	<u>Analyte</u>	<u>Column RTX-CLP Conc., µg/Kg</u>	<u>Column RTX-CLPII Conc., µg/Kg</u>	<u>%D</u>
3031-F-08-0508-F	4,4'-DDT	1.7	3.0	55
3031-F-04-0508-F	4,4'-DDT	4.5	12	91
	gamma-Chlordane	2.9	1.7	52
	alpha-Chlordane	2.1	1.2	55
3031-F-05-0508-F	4,4'-DDT	1.1	2.4	74
3031-F-06-0508-F	4,4'-DDT	1.4	3.0	73
3031-F-07-0508-F	Endrin	2.2	1.5	38
	4,4'-DDT	2.0	3.1	43
3031-F-08-0508-D	4,4'-DDT	5.0	8.7	54
3034-F-10-0508-F	gamma-Chlordane	1.2	3.9	110
3034-F-13-0508-F	4,4'-DDT	2.1	5.9	95
3034-F-4-0508-F	4,4'-DDT	9.1	12	27
	gamma-Chlordane	1.4	3.4	83
3034-F-9-0508-F	Endrin	1.3	0.82	45
	gamma-Chlordane	1.1	9.7	160
3034-F-11-0508-F	Endrin	1.7	1.1	43
	gamma-Chlordane	1.7	6.6	120
3034-F-12-0508-F	Endrin	3.2	2.4	29
	gamma-Chlordane	0.99	3.7	120
	alpha-Chlordane	1.5	1.0	40
3034-F-14-0508-F	4,4'-DDT	26	36	32
	gamma-Chlordane	1.8	9.5	140
	alpha-Chlordane	3.5	2.1	50
3034-F-5-0508-F	gamma-Chlordane	2.4	7.0	98
3034-F-6-0508-F	4,4'-DDT	13	17	27
	gamma-Chlordane	1.8	11	140
3034-F-7-0508-FD	gamma-Chlordane	1.9	4.8	87
	alpha-Chlordane	1.2	0.87	32
3034-F-8-0508-F	gamma-Chlordane	1.7	4.3	87



ICF International / Laboratory Data Consultants
Environmental Services Assistance Team, Region 9
1337 South 46th Street, Building 201, Richmond, CA 94804-4698
Phone: (510) 412-2300; Fax: (510) 412-2304.

MEMORANDUM

TO: Sharon Lin, Remedial Project Manager
Site Cleanup Section 2, SFD-7-2

THROUGH: Rose Fong, ESAT Task Order Manager (TOM)
Quality Assurance (QA) Program, MTS-3

FROM: Doug Lindelof, Data Review Task Manager
Region 9 Environmental Services Assistance Team (ESAT)

ESAT Contract No.: EP-W-06-041
Technical Direction Form No.: 00405016 Amendment 2

DATE: August 20, 2008

SUBJECT: Review of Analytical Data, **Tier 2**

Attached are comments resulting from ESAT Region 9 review of the following analytical data:

Site:	United Heckathorn
Site Account No.:	09 R3 QB01
CERCLIS ID No.:	CAD981436363
Case No.:	Not Provided
SDG No.:	125730
Laboratory:	TestAmerica
Analysis:	Organochlorine Pesticides
Samples:	18 Tissue Samples (see Case Summary)
Collection Date:	May 14 and 15, 2008
Reviewer:	Santiago Lee, ESAT/Laboratory Data Consultants (LDC)

This report has been reviewed by the EPA TOM for the ESAT contract, whose signature appears above.

If there are any questions, please contact Rose Fong (QA Program/EPA) at (415) 972-3812.

Attachment

SAMPLING ISSUES: Yes No

Data Validation Report - Tier 2

Case No.: Not Provided
SDG No.: 125730
Site: United Heckathorn
Laboratory: TestAmerica
Reviewer: Santiago Lee, ESAT/LDC
Date: August 20, 2008

I. CASE SUMMARY

Sample Information:

Samples: 3031-F-09-0508-F through 3031-F-21-0508-F, 3031-F-09-0508, 3031-F-10-0508, 3031-F-11-0508, 3033-F-01-0508, and 3033-F-02-0508-F
Concentration and Matrix: Tissue
Analysis: Organochlorine Pesticides
Method: SW-846 Method 8081A
Collection Date: May 14 and 15, 2008
Sample Receipt Date: May 21, 2008
Extraction Date: July 7, 2008
Analysis Date: July 11 and 12, 2008

Field QC:

Field Blanks (FB): Not Provided
Equipment Blanks (EB): Not Provided
Background Samples (BG): Not Provided
Field Duplicates (D1): Not Provided

Laboratory QC

Method Blanks & Associated Samples:

MBLK070508A: All samples, 3031-F-10-0508-FMS, 3031-F-10-0508-FMSD, 3031-F-09-0508-D, 3031-F-09-0508-FD, EQBLK03, and laboratory control sample (LCS) A070508LCS

Tables

1B: Data Qualifier Definitions for Organic Data Review
2: Analyte Concentration Summary

Sampling Issues

None.

Additional Comments

As directed by the TOM, Tier 3-level validation of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, 2,4'-DDD, and dieldrin and Tier 1A forms review on the remaining analytes were performed.

For 07/11/08 and 07/15/08 initial calibration verifications (ICVs), recoveries of methoxychlor (74.6%/78.8% and 78.1%/79.9%, respectively) exceeded the laboratory QC limit of 80-120%. Since recoveries are only slightly below the QC limit, no adverse effect on data quality is expected.

For duplicate pairs 3031-F-09-0508/3031-F-09-0508-D and 3031-F-09-0508-F/3031-F-09-0508-FD, results for 3031-F-09-0508 and 3031-F-09-0508-F are validated and reported in Table 1A. Each pair has similar surrogate recoveries (see attached Form 2s, pp. 68 and 69 in data package).

The laboratory reported the lower result generated by the two columns on a wet weight basis on the Form 1s; results below the reporting limit were not reported (see attached Case Narrative, sixth paragraph on p. 1.3 in data package).

The laboratory generated an "equipment blank", identified as "EBLK03", in order to characterize the homogenization process (see attached Case Narrative, third paragraph on p. 1.2 in data package).

This report was prepared in accordance with the following documents:

- X ESAT Region 9 Standard Operating Procedure 902, *Guidelines for Data Review of Contract Laboratory Program Analytical Services (CLPAS) Pesticide/PCB Data Packages*;
- X SW-846 Method 8081A, *Organochlorine Pesticides by Gas Chromatography*, Revision 1, December 1996; and
- X USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, July 2007.

II. VALIDATION SUMMARY

The data were evaluated based on the following parameters:

	<u>Parameter</u>	<u>Acceptable</u>	<u>Comment</u>
1.	Holding Time/Preservation	Yes	
2.	GC Performance	Yes	
3.	Initial Calibration	Yes	
4.	Continuing Calibration	No	C
5.	Laboratory Blanks	No	B
6.	Field Blanks	N/A	

7.	Surrogates	Yes	
8.	Matrix Spike/Matrix Spike Duplicates	No	D
9.	Laboratory Control Samples/Duplicates	Yes	
10.	Compound Identification	No	A
11.	Compound Quantitation	No	A, E
12.	System Performance	Yes	
13.	Field Duplicate Sample Analysis	N/A	

N/A = Not Applicable

III. VALIDITY AND COMMENTS

A. Detected results for the following analytes are considered presumptively identified and estimated due to confirmation problems and are flagged "NJ" in Table 1A.

- X Endosulfan I, endosulfan sulfate, 4,4'-DDT, endrin aldehyde, gamma-chlordane, alpha-chlordane, 2,4'-DDE, and 2,4'-DDT in sample 3031-F-09-0508
- X 4,4'-DDT and 2,4'-DDE in sample 3031-F-09-0508-F
- X 4,4'-DDT and gamma-chlordane in sample 3031-F-10-0508-F
- X 4,4'-DDT in samples 3031-F-11-0508-F, 3031-F-16-0508-F, 3031-F-17-0508-F, 3031-F-18-0508-F, 3031-F-19-0508-F, and 3031-F-20-0508-F
- X 4,4'-DDT, gamma-chlordane, alpha-chlordane, and 2,4'-DDT in sample 3031-F-11-0508
- X Endosulfan sulfate, 4,4'-DDT, gamma-chlordane, alpha-chlordane, 2,4'-DDE, and 2,4'-DDT in sample 3031-F-12-0508-F
- X 4,4'-DDT, gamma-chlordane, alpha-chlordane, and 2,4'-DDE in sample 3031-F-14-0508-F
- X Endrin, 4,4'-DDT, gamma-chlordane, alpha-chlordane, and 2,4'-DDE in samples 3031-F-15-0508-F and 3031-F-13-0508-F
- X 4,4'-DDT, gamma-chlordane, 2,4'-DDE, and 2,4'-DDT in sample 3031-F-21-0508-F
- X Endosulfan sulfate, 4,4'-DDT, endrin aldehyde, alpha-chlordane, and 2,4'-DDT in sample 3031-F-10-0508
- X gamma-chlordane and 2,4'-DDE in samples 3033-F-01-0508-F and 3033-F-02-0508-F

The percent differences (%D) in calculated concentrations between the RTX-CLP column and the RTX-CLP2 column ($\text{concentration}_a - \text{concentration}_i / \text{average concentration}$) exceeded the validation QC limit of 25.0% for analytes listed above (see Table 2).

The laboratory reported the lower concentrations and they are presented in Table 1A. It is the opinion of the reviewer that, due to the large %Ds between results quantitated from the two columns, it is questionable whether the presence of the

analytes listed above can be considered confirmed in the samples. Data users should note that these results are both qualitatively and quantitatively questionable.

- B. The following result is qualified as nondetected and estimated due to a method blank contamination and is flagged AUJ@ in Table 1A.

X Methoxychlor in sample 3031-F-09-0508

Methoxychlor was found in method blank MBLK070508A at a concentration of 1.5 ug/L. The methoxychlor result for sample 3031-F-09-0508 is considered nondetected and estimated (U,J) and the reporting limit has been raised according to blank qualification rules presented below.

No positive results are reported unless the concentration of the compound in the sample exceeds 5 times the amount in any associated blank. If the sample result is greater than the reporting limit, the reporting limit is raised to the sample result and reported as nondetected. If the sample result is less than the reporting limit, the result is reported as nondetected at the reporting limit.

A laboratory method blank is laboratory reagent water or baked sand analyzed with all reagents and surrogates and carried through the same sample preparation and analytical procedures as the field samples. The laboratory method blank is used to determine the level of contamination introduced by the laboratory during analysis.

- C. Results for the following analytes are qualified as estimated due to large percent differences (%Ds) in continuing calibration verifications (CCVs) and are flagged AJ@ or "UJ" in Table 1A.

X 4,4'-DDE in samples 3031-F-10-0508DL, 3031-F-13-0508-FDL, 3033-F-01-0508-F

%Ds for some analytes exceeded the $\pm 15\%$ method criterion for CCVs on columns RTX-CLP (see attached Form 7s; pp. 396, 402, and 403 in data package). For analytes with %Ds exceeding criterion on one column only, detected results reported from that column are qualified as estimated. Qualified detected results may be biased high.

The continuing calibration verification checks and documents satisfactory performance of the instrument over specific time periods during sample analysis.

- D. Matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent difference for 4,4'-DDE, endrin aldehyde, and 2,4'-DDE in QC samples 3031-F-10-0508-MS and 3031-F-10-0508-MSD were outside laboratory QC limits (see attached Form 3s; pp. 70 and 71 in data package). Results reported may indicate poor laboratory technique or matrix effects which may interfere with analysis. The recovery for 4,4'-DDE is not meaningful because the sample concentration (63

ug/Kg) is significantly higher than the spike concentration of 9.9 ug/Kg. Detected results for 2,4'-DDE and endrin aldehyde in sample 3031-F-10-0508 may be biased low. The effects on data quality for other samples are not known.

Matrix spike sample analysis provides information about the effect of the sample matrix on sample preparation and measurement.

- E. Samples 3031-F-09-0508, 3031-F-10-0508, and 3031-F-13-0508-F were reanalyzed at 3-, 2-, and 2-fold dilutions, respectively, due to high levels of 4,4'-DDE and that exceeded the calibration range. Results of 4,4'-DDE in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Sample 3033-F-01-0508-F was reanalyzed at a 200-fold dilution due to high levels of 4,4'-DDE, 4,4'-DDD, and 2,4'-DDD that exceeded the calibration range. Results of 4,4'-DDE, 4,4'-DDD, and 2,4'-DDD in sample 3033-F-01-0508-F are reported from the 200-fold diluted analysis in Table 1A; results for other analytes are reported from the 20-fold diluted analysis.

Sample 3033-F-02-0508-F was reanalyzed at a 200-fold dilution due to high levels of 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and 2,4'-DDD that exceeded the calibration range. Results of 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and 2,4'-DDD in sample 3033-F-02-0508-F are reported from the 200-fold diluted analysis in Table 1A; results for other analytes are reported from the 20-fold diluted analysis.

TABLE 1B

DATA QUALIFIER DEFINITIONS FOR ORGANIC DATA REVIEW

The definitions of the following qualifiers are prepared according to the document, "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," July 2007.

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
- L Indicates results which fall below the Contract Required Quantitation Limit. Results are estimated and are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.
- J The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- R The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

TABLE 2
Analyte Concentration Summary

Case No.: Not Provided
 SDG No.: 125730
 Site: United Heckathorn
 Laboratory: TestAmerica
 Reviewer: Santiago Lee, ESAT/LDC
 Date: August 19, 2008

<u>Sample</u>	<u>Analyte</u>	<u>Column RTX-CLP Conc., µg/Kg</u>	<u>Column RTX-CLPII Conc., µg/Kg</u>	<u>%D</u>
3031-F-09-0508	Endosulfan I	2.7	1.1	84
	Endosulfan sulfate	1.6	8.4	140
	4,4'-DDT	8.2	61	150
	Endrin aldehyde	8.0	2.1	120
	gamma-Chlordane	7.1	2.8	87
	alpha-Chlordane	6.0	2.4	86
	2,4'-DDE	6.1	13	72
	2,4'-DDT	0.95	20	180
	3031-F-09-0508-F	4,4'-DDT	1.1	7.9
2,4'-DDE		1.0	2.1	71
3031-F-10-0508-F	4,4'-DDT	2.1	7.8	120
	gamma-Chlordane	1.2	0.85	34
3031-F-11-0508	4,4'-DDT	4.0	16	120
	gamma-Chlordane	1.8	1.1	48
	alpha-Chlordane	2.8	1.3	73
	2,4'-DDT	1.1	1.7	43
3031-F-11-0508-F	4,4'-DDT	0.85	3.3	120
3031-F-12-0508-F	Endosulfan sulfate	0.81	2.8	110
	4,4'-DDT	4.1	23	140
	gamma-Chlordane	3.3	1.6	69
	alpha-Chlordane	2.7	1.9	35
	2,4'-DDE	3.4	6.3	60
	2,4'-DDT	0.99	4.1	120
3031-F-14-0508-F	4,4'-DDT	5.1	24	130
	gamma-Chlordane	3.2	2.0	46
	alpha-Chlordane	2.4	1.8	29
	2,4'-DDE	4.3	5.7	28
3031-F-15-0508-F	Endrin	2.1	1.5	33
	4,4'-DDT	3.1	17	140
	gamma-Chlordane	2.3	1.3	56
	alpha-Chlordane	1.8	1.1	48
	2,4'-DDE	3.0	4.3	36
3031-F-16-0508-F	4,4'-DDT	0.81	2.0	85
3031-F-17-0508-F	4,4'-DDT	0.80	1.3	48
3031-F-18-0508-F	4,4'-DDT	4.0	10	86

<u>Sample</u>	<u>Analyte</u>	<u>Column RTX-CLP Conc., µg/Kg</u>	<u>Column RTX-CLPII Conc., µg/Kg</u>	<u>%D</u>
3031-F-19-0508-F	4,4'-DDT	7.1	12	51
3031-F-20-0508-F	4,4'-DDT	7.1	11	43
3031-F-21-0508-F	4,4'-DDT	4.4	11	86
	gamma-Chlordane	1.8	1.3	32
	2,4'-DDE	2.3	3.1	30
	2,4'-DDT	1.1	1.5	31
3031-F-10-0508	Endosulfan sulfate	0.96	5.4	140
	4,4'-DDT	7.7	40	140
	Endrin aldehyde	4.9	1.1	130
	alpha-Chlordane	1.7	1.3	27
	2,4'-DDT	1.5	2.2	38
3031-F-13-0508-F	Endrin	2.4	1.8	29
	4,4'-DDT	19	32	51
	gamma-Chlordane	3.0	2.0	40
	alpha-Chlordane	2.0	1.0	67
	2,4'-DDE	3.9	5.8	39
3033-F-01-0508-F	gamma-Chlordane	30	160	140
	2,4'-DDE	240	68	110
3033-F-02-0508-F	gamma-Chlordane	47	170	110
	2,4'-DDE	260	110	81



ICF International / Laboratory Data Consultants
Environmental Services Assistance Team, Region 9
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Phone: (510) 412-2300; Fax: (510) 412-2304.

MEMORANDUM

TO: Sharon Lin, Remedial Project Manager
Site Cleanup Section 2, SFD-7-2

THROUGH: Rose Fong, ESAT Task Order Manager (TOM)
Quality Assurance (QA) Program, MTS-3

FROM: Doug Lindelof, Data Review Task Manager
Region 9 Environmental Services Assistance Team (ESAT)

ESAT Contract No.: EP-W-06-041
Technical Direction Form No.: 00405016 Amendment 2

DATE: August 26, 2008

SUBJECT: Review of Analytical Data, **Tier 2**

Attached are comments resulting from ESAT Region 9 review of the following analytical data:

Site:	United Heckathorn
Site Account No.:	09 R3 QB01
CERCLIS ID No.:	CAD981436363
Case No.:	Not Provided
SDG No.:	125733
Laboratory:	TestAmerica
Analysis:	Organochlorine Pesticides
Samples:	18 Tissue Samples (see Case Summary)
Collection Date:	May 14 and 15, 2008
Reviewer:	Santiago Lee, ESAT/Laboratory Data Consultants (LDC)

This report has been reviewed by the EPA TOM for the ESAT contract, whose signature appears above.

If there are any questions, please contact Rose Fong (QA Program/EPA) at (415) 972-3812.

Attachment

SAMPLING ISSUES: Yes No

Data Validation Report - Tier 2

Case No.: Not Provided
SDG No.: 125733
Site: United Heckathorn
Laboratory: TestAmerica
Reviewer: Santiago Lee, ESAT/LDC
Date: August 26, 2008

I. CASE SUMMARY

Sample Information:

Samples: 3033-F-03-0508-F through 3033-F-15-0508-F and
3036-F-1-0508-F through 3036-F-5-0508-F
Concentration and Matrix: Tissue
Analysis: Organochlorine Pesticides
Method: SW-846 Method 8081A
Collection Date: May 14 and 15, 2008
Sample Receipt Date: May 21, 2008
Extraction Date: July 2, 2008
Analysis Date: July 18, 19, and 20, 2008

Field QC:

Field Blanks (FB): Not Provided
Equipment Blanks (EB): Not Provided
Background Samples (BG): Not Provided
Field Duplicates (D1): Not Provided

Laboratory QC

Method Blanks & Associated Samples:

MBLK070208C: All samples, 3033-F-05-0508-FMS, 3033-F-05-0508-FMSD, 3033-F-03-0508-FD, 3033-F-10-0508-FD, EQBLK04, and laboratory control sample (LCS) C070208LCS

Tables

1B: Data Qualifier Definitions for Organic Data Review
2: Analyte Concentration Summary

Sampling Issues

None.

Additional Comments

As directed by the TOM, Tier 3-level validation of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, 2,4'-DDD, and dieldrin and Tier 1A forms review on the remaining analytes were performed.

For the 07/19/08 16:44 continuing calibration verification (CCV), percent differences (%Ds) of heptachlor epoxide (17.1%), endrin ketone (15.4%), and 2,4'-DDE (17.1%) on column RTX-CLP exceeded the $\pm 15\%$ method criterion. For the 07/19/08 23:13 CCV, the %D of beta-BHC (15.5%) on column RTX-CLP exceeded the $\pm 15\%$ method criterion. No data are qualified since heptachlor epoxide and 2,4'-DDE results are reported from the RTX-CLPII column due to resolution problems (see Comments B and C) and beta-BHC were not detected in the samples.

For the 07/18/08 initial calibration verification (ICV), the recovery of heptachlor epoxide on column RTX-CLP (153.9%) exceeded the laboratory QC limit of 80-120%. This recovery is not meaningful due to resolution problems (see Comment B). For the 07/22/08 ICV, recoveries of methoxychlor (77.4%) and endrin aldehyde (79.3%) on column RTX-CLP and the recovery of endrin aldehyde (79.8%) on column RTX-CLPII exceeded the laboratory QC limit of 80-120%. Since recoveries are only slightly below the QC limit, no adverse effect on data quality is expected.

For duplicate pairs 3033-F-03-0508-F/3033-F-03-0508-FD and 3033-F-10-0508-F/3033-F-10-0508-FD, results for 3033-F-03-0508-F and 3033-F-10-0508-FD are validated and reported in Table 1A since they have similar surrogate recoveries (see attached Form 2s, pp. 69 and 70 in data package).

A retention time (RT) shift was observed on the RTX-CLP column in the 07/18/08 and 07/19/08 analytical sequences (see attached Form 8, pp. 558, 559, and 560 in data package). No adverse effect on data quality is expected since the RTs for the RTX-CLPII column were within RT windows and no false negatives were noticed by the ESAT reviewer (i.e., analytes detected in the RTX-CLPII column were also detected in the RTX-CLP column).

The laboratory reported the lower result generated by the two columns, on a wet weight basis, on the Form 1s; results below the reporting limit were not reported (see attached Case Narrative, seventh paragraph on p. 1.3 in data package).

The laboratory generated an "equipment blank", identified as "EBLK04", in order to characterize the homogenization process (see attached Case Narrative, third paragraph on p. 1.2 in data package).

This report was prepared in accordance with the following documents:

- X ESAT Region 9 Standard Operating Procedure 902, *Guidelines for Data Review of Contract Laboratory Program Analytical Services (CLPAS) Pesticide/PCB Data Packages*;
- X SW-846 Method 8081A, *Organochlorine Pesticides by Gas Chromatography*, Revision 1, December 1996; and

X USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, July 2007.

II. VALIDATION SUMMARY

The data were evaluated based on the following parameters:

	<u>Parameter</u>	<u>Acceptable</u>	<u>Comment</u>
1.	Holding Time/Preservation	Yes	
2.	GC Performance	Yes	
3.	Initial Calibration	Yes	
4.	Continuing Calibration Verification	Yes	
5.	Laboratory Blanks	Yes	
6.	Field Blanks	N/A	
7.	Surrogates	Yes	
8.	Matrix Spike/Matrix Spike Duplicates	N/A	D
9.	Laboratory Control Samples/Duplicates	Yes	
10.	Compound Identification	No	A, B
11.	Compound Quantitation	No	A, B, C, E
12.	System Performance	Yes	
13.	Field Duplicate Sample Analysis	N/A	

N/A = Not Applicable

III. VALIDITY AND COMMENTS

A. Detected results for the following analytes are considered presumptively identified and estimated due to confirmation problems and are flagged "NJ" in Table 1A.

- X Endrin, endosulfan II, and gamma-chlordane in sample 3033-F-03-0508-F
- X gamma-Chlordane in samples 3033-F-04-0508-F, 3033-F-06-0508-F, 3033-F-07-0508-F, 3033-F-10-0508FD, 3033-F-11-0508-F, 3033-F-12-0508-F, 3033-F-13-0508-F, 3036-F-2-0508-F, 3036-F-3-0508-F, and 3036-F-5-0508-F
- X alpha-Chlordane in sample 3033-F-05-0508-F
- X Endrin and gamma-chlordane in sample 3033-F-08-0508-F
- X Dieldrin, endrin, endosulfan sulfate, methoxychlor, endrin aldehyde, gamma-chlordane, and alpha-chlordane in sample 3036-F-1-0508-F
- X 4,4'-DDE and 4,4'-DDT in sample 3036-F-1-0508-FDL
- X Endrin and gamma-chlordane in sample 3033-F-14-0508-F
- X Endrin and gamma-chlordane in sample 3033-F-15-0508-F
- X Endosulfan II and gamma-chlordane in sample 3036-F-4-0508-F

The percent differences (%D) in calculated concentrations between the RTX-CLP column and the RTX-CLP2 column ($\text{concentration}_a - \text{concentration}_b / \text{average concentration}$) exceeded the validation QC limit of 25.0% for analytes listed above (see Table 2).

The laboratory reported the lower concentrations and they are presented in Table 1A. It is the opinion of the reviewer that, due to the large %Ds between results quantitated from the two columns, it is questionable whether the presence of the analytes listed above can be considered confirmed in the samples. Data users should note that these results are both qualitatively and quantitatively questionable.

- B. Detected results for the following analyte are considered presumptively identified and estimated due to resolution problems and are flagged ANJ@ in Table 1A.

X Heptachlor epoxide in samples 3033-F-03-0508-F, 3033-F-14-0508-F, 3033-F-15-0508-F, 3036-F-01-0508-F, and 3036-F-04-0508-F

For the column RTX-CLP, heptachlor epoxide co-eluted with 2,4'-DDE. Consequently, all heptachlor epoxide detected results were reported from the RTX-CLPII column in Table 1A. Data users should note that results for heptachlor epoxide in samples listed above are both qualitatively and quantitatively questionable.

- C. Detected results for the following analyte are qualified as estimated due to resolution problems and are flagged AJ@ in Table 1A.

X 2,4'-DDE in samples 3033-F-03-0508-F, 3033-F-04-0508-F, 3033-F-05-0508-F, 3033-F-06-0508-F, 3033-F-07-0508-F, 3033-F-08-0508-F, 3033-F-09-0508-F, 3033-F-10-0508-FD, 3033-F-11-0508-F, 3033-F-12-0508-F, 3033-F-13-0508-F, 3033-F-14-0508-F, 3033-F-15-0508-F, 3036-F-1-0508-FDL, 3036-F-2-0508-F, 3036-F-3-0508-F, 3036-F-4-0508-F, and 3036-F-5-0508-F

For the column RTX-CLP, 2,4'-DDE co-eluted with heptachlor epoxide. Consequently, all 2,4'-DDE detected results were reported from the RTX-CLPII column in Table 1A. It is the reviewer's opinion that 2,4'-DDE is present in these samples because 2,4'-DDD, 2,4'-DDT, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT are also found in the samples.

- D. Matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent differences for dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, 2,4'-DDD, and 2,4'-DDT in QC samples 3033-F-05-0508-FMS and 3033-F-05-0508-FMSD were outside laboratory QC limits (see attached Form 3s; pp. 71 and 72 in data package). These recoveries are not meaningful because sample concentrations (130-690 ug/Kg) are significantly higher than the spike concentration of 10 ug/Kg.

Matrix spike sample analysis provides information about the effect of the sample matrix on sample preparation and measurement.

- E. Sample 3033-F-03-0508-F was reanalyzed at a 10-fold dilution due to high levels of 2,4'-DDD, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin that exceeded the calibration range. Results of these analytes in sample 3033-F-03-0508-F are

reported from the diluted analysis in Table 1A; results for other analytes are reported from the undiluted analysis.

Samples 3033-F-04-0508-F and 3030-F-09-0508-F were reanalyzed at 200-fold and 5-fold dilutions, respectively, due to high levels of 4,4'-DDD that exceeded the calibration range. Results of 4,4'-DDD in these samples are reported from these diluted analyses in Table 1A; results for other analytes are reported from the 20-fold and 5-fold diluted analyses, respectively.

Samples 3033-F-05-0508-F, 3033-F-10-0508-F, 3033-F-12-0508-F, and 3033-F-13-0508-F were reanalyzed at 50-, 50-, 20-, 20-fold dilutions, respectively, due to high levels of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT that exceeded the calibration range. Results of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT in samples 3033-F-05-0508-F, 3033-F-10-0508-F, 3033-F-12-0508-F, and 3033-F-13-0508-F are reported from these diluted analyses in Table 1A; results for other analytes are reported from the 5-, 5-, 2-, 2-fold diluted analyses, respectively.

Sample 3033-F-06-0508-F was reanalyzed at a 200-fold dilution due to high levels of 4,4'-DDD and 4,4'-DDE that exceeded the calibration range. Results of these analytes in sample 3033-F-06-0508-F are reported from the 20-fold diluted analysis in Table 1A; results for other analytes are reported from the 200-fold diluted analysis.

Sample 3033-F-07-0508-F was reanalyzed at a 50-fold dilution due to high levels of 2,4'-DDD, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT that exceeded the calibration range. Results of these analytes in sample 3033-F-07-0508-F are reported from the 50-fold diluted analysis in Table 1A; results for other analytes are reported from the 5-fold diluted analysis.

Sample 3033-F-08-0508-F was reanalyzed at a 20-fold dilution due to high levels of 4,4'-DDD and 4,4'-DDT that exceeded the calibration range. Results of these analytes in sample 3033-F-08-0508-F are reported from the 20-diluted analysis in Table 1A; results for other analytes are reported from the 2-fold diluted analysis.

Samples 3033-F-11-0508-F, 3033-F-14-0508-F, and 3033-F-15-0508-F were reanalyzed at 20-, 10-, and 200-fold dilutions, respectively, due to high levels of 2,4'-DDD, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin that exceeded the calibration range. Results of these analytes in samples 3033-F-11-0508-F, 3033-F-14-0508-F, and 3033-F-15-0508-F are reported from these diluted analyses in Table 1A; results for other analytes are reported from the 2-fold diluted, undiluted, and 2-fold diluted analyses, respectively.

Samples 3036-F-2-0508-F, 3036-F-3-0508-F, 3036-F-4-0508-F, and 3036-F-5-0508-F were reanalyzed at 10-, 5-, 10-, 10-fold dilutions, respectively, due to high levels of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT that exceeded the calibration range. Results of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT in these samples are reported from

the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Sample 3036-F-1-0508-F was reanalyzed at a 10-fold dilution due to high levels of 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and 2,4'-DDE that exceeded the calibration range. Results of these analytes in sample 3036-F-1-0508-F are reported from the diluted analysis in Table 1A; results for other analytes are reported from the undiluted analysis.

TABLE 1B

DATA QUALIFIER DEFINITIONS FOR ORGANIC DATA REVIEW

The definitions of the following qualifiers are prepared according to the document, "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," July 2007.

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
- L Indicates results which fall below the Contract Required Quantitation Limit. Results are estimated and are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.
- J The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- R The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

TABLE 2
Analyte Concentration Summary

Case No.: Not Provided
 SDG No.: 125733
 Site: United Heckathorn
 Laboratory: TestAmerica
 Reviewer: Santiago Lee, ESAT/LDC
 Date: August 26, 2008

<u>Sample</u>	<u>Analyte</u>	Column RTX-CLP <u>Conc., µg/Kg</u>	Column RTX-CLPII <u>Conc., µg/Kg</u>	<u>%D</u>
3033-F-03-0508-F	Endrin	9.3	6.6	34
	Endosulfan II	2.8	0.93	100
	gamma-Chlordane	2.4	3.9	48
3033-F-04-0508-F	gamma-Chlordane	19	88	130
3033-F-05-0508-F	alpha-Chlordane	5.9	4.4	29
3033-F-06-0508-F	gamma-Chlordane	19	110	140
3033-F-07-0508-F	gamma-Chlordane	4.8	34	150
3033F-08-0508-F	Endrin	3.2	2.1	42
	gamma-Chlordane	1.9	8.7	130
3033-F-10-0508-FD	gamma-Chlordane	4.4	31	150
3036-F-1-0508-F	Dieldrin	84	9.8	160
	Endrin	30	3.4	160
	Endosulfan sulfate	3.2	96	190
	Methoxychlor	150	1.5	200
	Endrin aldehyde	110	2.0	190
	gamma-Chlordane	59	8.9	150
	alpha-Chlordane	7.6	2.6	98
3036-F-1-0508-FDL	4,4'-DDE	200	280	33
	4,4'-DDT	120	440	110
3033-F-11-0508-F	gamma-Chlordane	3.4	11	110
3033-F-12-0508-F	gamma-Chlordane	2.0	11	140
3033-F-13-0508-F	gamma-Chlordane	2.1	12	140
3033-F-14-0508-F	Endrin	3.4	2.5	31
	gamma-Chlordane	1.5	8.3	140
3033-F-15-0508-F	Endrin	5.6	3.9	36
	gamma-Chlordane	12	82	150
3036-F-2-0508-F	gamma-Chlordane	1.9	24	170
3036-F-3-0508-F	gamma-Chlordane	1.2	5.5	130
3036-F-4-0508-F	Endosulfan II	0.80	8.5	170
	gamma-Chlordane	5.2	25	130
3036-F-5-0508-F	gamma-Chlordane	1.4	8.0	140



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MEMORANDUM

TO: Sharon Lin, Remedial Project Manager
Site Cleanup Section 2, SFD-7-2

THROUGH: Rose Fong, ESAT Task Order Manager (TOM)
Quality Assurance (QA) Program, MTS-3

FROM: Doug Lindelof, Data Review Task Manager
Region 9 Environmental Services Assistance Team (ESAT)

ESAT Contract No.: EP-W-06-041
Technical Direction Form No.: 00405016 Amendment 2

DATE: August 13, 2008

SUBJECT: Review of Analytical Data, **Tier 2**

Attached are comments resulting from ESAT Region 9 review of the following analytical data:

Site:	United Heckathorn
Site Account No.:	09 R3 QB01
CERCLIS ID No.:	CAD981436363
Case No.:	Not Provided
SDG No.:	125735
Laboratory:	TestAmerica
Analysis:	Organochlorine Pesticides
Samples:	6 Tissue Samples (see Case Summary)
Collection Date:	May 15, 2008
Reviewer:	Santiago Lee, ESAT/Laboratory Data Consultants

This report has been reviewed by the EPA TOM for the ESAT contract, whose signature appears above.

If there are any questions, please contact Rose Fong (QA Program/EPA) at (415) 972-3812.

Attachment

SAMPLING ISSUES: Yes No

Data Validation Report - Tier 2

Case No.: Not Provided
SDG No.: 125735
Site: United Heckathorn
Laboratory: TestAmerica
Reviewer: Santiago Lee, ESAT/LDC
Date: August 13, 2008

I. CASE SUMMARY

Sample Information:

Samples: 3036-F-06-0508-F through 3036-F-11-0508-F
Concentration and Matrix: Tissue
Analysis: Organochlorine Pesticides
Method: SW-846 Method 8081A
Collection Date: May 15, 2008
Sample Receipt Date: May 21, 2008
Extraction Date: July 7, 2008
Analysis Date: July 16, 2008

Field QC:

Field Blanks (FB): Not Provided
Equipment Blanks (EB): Not Provided
Background Samples (BG): Not Provided
Field Duplicates (D1): Not Provided

Laboratory QC

Method Blanks & Associated Samples:

MBLK070708G: All samples, 3036-F-11-0508-FMS, 3036-F-11-0508-FMSD, 3036-F-07-0508-FD, 3036-F-09-0508-FD, EQBLK05, and laboratory control sample (LCS) G070708LCS

Tables

1B: Data Qualifier Definitions for Organic Data Review
2: Analyte Concentration Summary

Sampling Issues

None.

Additional Comments

As directed by the TOM, Tier 3-level validation of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, 2,4'-DDD, and dieldrin and Tier 1A forms review on the remaining analytes were performed.

Recoveries of methoxychlor (78.1%/79.7%) for the initial calibration verification on both columns exceeded the laboratory QC limit of 80-120%. Since recoveries are only slightly below the QC limit, no adverse effect is expected.

For duplicate pairs 3036-F-07-0508-F/3036-F-07-0508-FD and 3036-F-09-0508-F/3036-F-09-0508-FD, results for 3036-F-07-0508-FD and 3036-F-09-0508-FD are validated and reported in Table 1A since they have higher surrogate recoveries (see attached Form 2, p. 43 in data package).

The laboratory reported the lower result generated by the two columns, on a wet weight basis, on the Form 1s; results below the reporting limit were not reported (see attached Case Narrative, first paragraph on p. 1.3 in data package).

The laboratory generated an "equipment blank", identified as "EBLK05", in order to characterize the homogenization process (see attached Case Narrative, second paragraph on p. 1.2 in data package).

This report was prepared in accordance with the following documents:

- X ESAT Region 9 Standard Operating Procedure 902, *Guidelines for Data Review of Contract Laboratory Program Analytical Services (CLPAS) Pesticide/PCB Data Packages*;
- X SW-846 Method 8081A, *Organochlorine Pesticides by Gas Chromatography*, Revision 1, December 1996; and
- X *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*, July 2007.

II. VALIDATION SUMMARY

The data were evaluated based on the following parameters:

	<u>Parameter</u>	<u>Acceptable</u>	<u>Comment</u>
1.	Holding Time/Preservation	Yes	
2.	GC Performance	Yes	
3.	Initial Calibration	Yes	
4.	Continuing Calibration	No	B
5.	Laboratory Blanks	Yes	
6.	Field Blanks	N/A	
7.	Surrogates	Yes	

8.	Matrix Spike/Matrix Spike Duplicates	No	C
9.	Laboratory Control Samples/Duplicates	Yes	
10.	Compound Identification	No	A
11.	Compound Quantitation	No	A, D
12.	System Performance	Yes	
13.	Field Duplicate Sample Analysis	N/A	

N/A = Not Applicable

III. VALIDITY AND COMMENTS

A. Detected results for the following analytes are considered presumptively identified and estimated due to confirmation problems and are flagged "NJ" in Table 1A.

- X Endosulfan II, gamma-chlordane, alpha-chlordane, and 2,4'-DDE in sample 3036-F-06-0508-F
- X 4,4'-DDT in sample 3036-F-06-0508-FDL
- X gamma-Chlordane and alpha-chlordane in sample 3036-F-07-0508-FD
- X Endrin, endosulfan II, and alpha-chlordane in sample 3036-F-08-0508-F
- X Endrin, endosulfan sulfate, 4,4'-DDT, and alpha-chlordane in sample 3036-F-09-0508-FD
- X Endosulfan I, 4,4'-DDT, gamma-chlordane, and alpha-chlordane in sample 3036-F-10-0508-F
- X Endosulfan I, endosulfan sulfate, 4,4'-DDT, and alpha-chlordane in sample 3036-F-11-0508-F

Percent differences (%D) in calculated concentrations between the RTX-CLP column and the RTX-CLP2 column ($\text{concentration}_a - \text{concentration}_b / \text{average concentration}$) exceeded the validation QC limit of 25.0% for analytes listed above (see Table 2).

The laboratory reported the lower concentrations and they are presented in Table 1A. It is the opinion of the reviewer that, due to the large %Ds between results quantitated from the two columns, it is questionable whether the presence of the analytes listed above can be considered confirmed in the samples. Data users should note that these results are both qualitatively and quantitatively questionable.

B. Results for the following analytes are qualified as estimated due to large percent differences (%Ds) in continuing calibration verifications (CCVs) and are flagged AJ@ or "UJ" in Table 1A.

- X Endosulfan sulfate in samples 3036-F-09-0508-FD and 3036-F-11-0508-F
- X 4,4'-DDT in samples 3036-F-08-0508-FDL, 3036-F-09-0508-FD, 3036-F-10-0508-F, and 3036-F-11-0508-F
- X g-Chlordane in samples 3036-F-07-0508-FD, 3036-F-08-0508-F, and 3036-F-11-0508-F

A %D of +15.4% was reported for 4,4'-DDD on column RTX-CLP in the 07/16/08 04:16 CCV. This value exceeded the $\pm 15\%$ method criterion. For 07/16/08 10:26 and 15:45 CCVs, %Ds for several analytes on RTX-CLP column exceeded the $\pm 15\%$ method criterion (see attached Form 7s; pp. 254 and 255 in data package). Detected results reported from the RTX-CLP column are qualified as estimated and may be biased high. No 4,4'-DDD results are qualified since detected results were reported from the RTX-CLPII column.

The continuing calibration verification checks and documents satisfactory performance of the instrument over specific time periods during sample analysis.

- C. Matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent differences (RPDs) for 4,4'-DDE, 4,4'-DDD, and endrin aldehyde in QC samples 3036-F-11-0508-FMS and 3036-F-11-0508-FMSD were outside laboratory QC limits (see attached Form 3s; pp. 45 and 46 in data package). Results reported may indicate poor laboratory technique or matrix effects which may interfere with analysis. Detected results for 4,4'-DDE and 4,4'-DDD in sample 3036-F-11-0508-F may be biased high. Since endrin aldehyde was not detected in sample 3036-F-11-0508-F, a false negative may exist. The effects on data quality for other samples are not known.

Matrix spike sample analysis provides information about the effect of the sample matrix on sample preparation and measurement.

- D. Samples 3036-F-06-0508-F, 3036-F-07-0508-FD, and 3036-F-08-0508-F were reanalyzed at 20-, 5-, and 3-fold dilutions, respectively due to high levels of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT that exceeded the calibration range. Results of 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Samples 3036-F-09-0508-FD and 3036-F-11-0508-F were reanalyzed at 3-fold dilutions due to high levels of 4,4'-DDE and 4,4'-DDD that exceeded the calibration range. Results of 4,4'-DDE and 4,4'-DDD in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Sample 3036-F-10-0508-F was reanalyzed at 2-fold dilution due to a high level of 4,4'-DDE that exceeded the calibration range. The result of 4,4'-DDE in sample 3036-F-10-0508-F is reported from the diluted analysis in Table 1A; results for other analytes are reported from the undiluted analysis.

TABLE 1B

DATA QUALIFIER DEFINITIONS FOR ORGANIC DATA REVIEW

The definitions of the following qualifiers are prepared according to the document, "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," July 2007.

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
- L Indicates results which fall below the Contract Required Quantitation Limit. Results are estimated and are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.
- J The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- R The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

TABLE 2
Analyte Concentration Summary

Case No.: Not Provided
 SDG No.: 125735
 Site: United Heckathorn
 Laboratory: TestAmerica
 Reviewer: Santiago Lee, ESAT/LDC
 Date: August 13, 2008

<u>Sample</u>	<u>Analyte</u>	<u>Column RTX-CLP Conc., µg/Kg</u>	<u>Column RTX-CLPII Conc., µg/Kg</u>	<u>%D</u>
3036-F-06-0508-F	Endosulfan II	6.3	2.3	93
	gamma-Chlordane	21	62	99
	alpha-Chlordane	8.0	4.5	56
	2,4'-DDE	110	52	72
3036-F-06-0508-FDL	4,4'-DDT	120	170	34
3036-F-07-0508-FD	gamma-Chlordane	3.8	6.1	46
	alpha-Chlordane	5.0	2.8	56
3036-F-08-0508-F	Endrin	1.7	0.97	55
	Endosulfan II	1.7	0.96	56
	alpha-Chlordane	6.6	3.2	69
3036-F-09-0508-FD	Endrin	1.8	0.81	76
	Endosulfan sulfate	0.97	4.5	130
	4,4'-DDT	20	36	57
	alpha-Chlordane	5.8	2.5	80
3036-F-10-0508-F	Endosulfan I	0.89	6.7	150
	4,4'-DDT	7.6	22	97
	gamma-Chlordane	3.5	2.0	55
	alpha-Chlordane	4.7	2.3	69
3036-F-11-0508-F	Endosulfan I	1.2	3.4	96
	Endosulfan sulfate	0.80	3.9	130
	4,4'-DDT	23	35	41
	alpha-Chlordane	5.1	2.6	65



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MEMORANDUM

TO: Sharon Lin, Remedial Project Manager
Site Cleanup Section 2, SFD-7-2

THROUGH: Rose Fong, ESAT Task Order Manager (TOM)
Quality Assurance (QA) Program, MTS-3

FROM: Doug Lindelof, Data Review Task Manager
Region 9 Environmental Services Assistance Team (ESAT)

ESAT Contract No.: EP-W-06-041
Technical Direction Form No.: 00405016 Amendment 2

DATE: August 27, 2008

SUBJECT: Review of Analytical Data, **Tier 2**

Attached are comments resulting from ESAT Region 9 review of the following analytical data:

Site:	United Heckathorn
Site Account No.:	09 R3 QB01
CERCLIS ID No.:	CAD981436363
Case No.:	Not Provided
SDG No.:	126115
Laboratory:	TestAmerica
Analysis:	Organochlorine Pesticides
Samples:	18 Tissue Samples (see Case Summary)
Collection Date:	June 12, 2008
Reviewer:	Santiago Lee, ESAT/Laboratory Data Consultants (LDC)

This report has been reviewed by the EPA TOM for the ESAT contract, whose signature appears above.

If there are any questions, please contact Rose Fong (QA Program/EPA) at (415) 972-3812.

Attachment

SAMPLING ISSUES: Yes No

Data Validation Report - Tier 2

Case No.: Not Provided
SDG No.: 126115
Site: United Heckathorn
Laboratory: TestAmerica
Reviewer: Santiago Lee, ESAT/LDC
Date: August 27, 2008

I. CASE SUMMARY

Sample Information:

Samples: 3033-F-16-0508 through 3033-F-20-0508, 3034-F-21-0508 through 3034-F-24-0508, 3033-F-16-0508-F through 3033-F-20-0508-F, and 3034-F-21-0508-F through 3034-F-24-0508-F
Concentration and Matrix: Tissue
Analysis: Organochlorine Pesticides
Method: SW-846 Method 8081A
Collection Date: June 12, 2008
Sample Receipt Date: June 20, 2008
Extraction Date: July 16, 2008
Analysis Date: July 23 and 24, 2008

Field QC:

Field Blanks (FB): Not Provided
Equipment Blanks (EB): Not Provided
Background Samples (BG): Not Provided
Field Duplicates (D1): Not Provided

Laboratory QC

Method Blanks & Associated Samples:
MBLK071608E: All samples, 3033-F-20-0508-MS, 3033-F-05-0508-MSD, 3033-F-18-0508-D, 3033-F-20-0508-FD, EQBLK06, and laboratory control sample (LCS) E071608LCS

Tables

1B: Data Qualifier Definitions for Organic Data Review
2: Analyte Concentration Summary

Sampling Issues

None.

Additional Comments

As directed by the TOM, Tier 3-level validation of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, 2,4'-DDD, and dieldrin and Tier 1A forms review on the remaining analytes were performed.

For the 07/22/08 initial calibration verification (ICV), the recovery of heptachlor epoxide on column RTX-CLP (120.3%) exceeded the laboratory QC limit of 80-120%. This recovery is not meaningful due to resolution problems (see Comment B). Recoveries on column RTX-CLP for methoxychlor (77.4%) and endrin aldehyde (79.3%) and the recovery on column RTX-CLPII for endrin aldehyde (79.8%) exceeded the laboratory QC limit of 80-120%. Since recoveries are only slightly below the QC limit, no adverse effect on data quality is expected.

For duplicate pairs 3033-F-18-0508/3033-F-18-0508-D and 3033-F-20-0508-F/3033-F-20-0508-FD, results for 3033-F-18-0508-D and 3033-F-20-0508-FD are validated and reported in Table 1A since they have higher surrogate recoveries (see attached Form 2s, pp. 67 and 68 in data package).

A retention time (RT) shift was observed on the RTX-CLP column in the 07/24/08 analytical sequence (see attached Form 8, p. 419 in data package). No adverse effect on data quality is expected since the RTs for the RTX-CLPII column were within RT windows and no false negatives were noticed by the ESAT reviewer (i.e., analytes detected in the RTX-CLPII column were also detected in the RTX-CLP column).

The laboratory reported the lower result generated by the two columns, on a wet weight basis, on the Form 1s; results below the reporting limit were not reported (see attached Case Narrative, fifth paragraph on p. 1.3 in data package).

The laboratory generated an "equipment blank", identified as "EBLK06", in order to characterize the homogenization process (see attached Case Narrative, third paragraph on p. 1.2 in data package).

This report was prepared in accordance with the following documents:

- X ESAT Region 9 Standard Operating Procedure 902, *Guidelines for Data Review of Contract Laboratory Program Analytical Services (CLPAS) Pesticide/PCB Data Packages*;
- X SW-846 Method 8081A, *Organochlorine Pesticides by Gas Chromatography*, Revision 1, December 1996; and
- X USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, July 2007.

II. VALIDATION SUMMARY

The data were evaluated based on the following parameters:

	<u>Parameter</u>	<u>Acceptable</u>	<u>Comment</u>
1.	Holding Time/Preservation	Yes	
2.	GC Performance	Yes	
3.	Initial Calibration	Yes	
4.	Continuing Calibration Verification	No	D
5.	Laboratory Blanks	Yes	
6.	Field Blanks	N/A	
7.	Surrogates	Yes	
8.	Matrix Spike/Matrix Spike Duplicates	N/A	F
9.	Laboratory Control Samples/Duplicates	No	E
10.	Compound Identification	No	A, B
11.	Compound Quantitation	No	A, B, C, G
12.	System Performance	Yes	
13.	Field Duplicate Sample Analysis	N/A	

N/A = Not Applicable

III. VALIDITY AND COMMENTS

A. Detected results for the following analytes are considered presumptively identified and estimated due to confirmation problems and are flagged "NJ" in Table 1A.

- X 2,4'-DDD in sample 3033-F-16-0508
- X 4,4'-DDT and 2,4'-DDD in sample 3033-F-16-0508-F
- X gamma-Chlordane in sample 3033-F-19-0508-F
- X alpha-Chlordane in samples 3033-F-20-0508 and 3034-F-22-0508
- X Endrin, 4,4'-DDT, gamma-chlordane, and alpha-chlordane in sample 3034-F-21-0508
- X 4,4'-DDT in sample 3034-F-21-0508-F, 3034-F-23-0508-F, and 3034-F-24-0508-F
- X Endrin, gamma-chlordane, and alpha-chlordane in sample 3034-F-23-0508
- X 4,4'-DDT, and 2,4'-DDT in sample 3034-F-24-0508

The percent differences (%D) in calculated concentrations between the RTX-CLP column and the RTX-CLP2 column ($\text{concentration}_a - \text{concentration}_b / \text{average concentration}$) exceeded the validation QC limit of 25.0% for analytes listed above (see Table 2).

The laboratory reported the lower concentrations and they are presented in Table 1A. It is the opinion of the reviewer that, due to the large %Ds between results quantitated from the two columns, it is questionable whether the presence of the analytes listed above can be considered confirmed in the samples. Data users should note that these results are both qualitatively and quantitatively questionable.

B. Detected results for the following analyte are considered presumptively identified and estimated due to resolution problems and are flagged ANJ@ in Table 1A.

X Heptachlor epoxide in samples 3033-F-19-0508-F, 3033-F-20-0508, 3034-F-21-0508, 3034-F-21-0508-F, 3034-F-22-0508, 3034-F-23-0508, 3034-F-23-0508-F, and 3034-F-24-0508

For the column RTX-CLP, heptachlor epoxide co-eluted with 2,4'-DDE. Consequently, all heptachlor epoxide detected results were reported from the RTX-CLPII column in Table 1A. Data users should note that results for heptachlor epoxide in samples listed above are both qualitatively and quantitatively questionable.

C. Detected results for the following analyte are qualified as estimated due to resolution problems and are flagged AJ@ in Table 1A.

X 2,4'-DDE in samples 3033-F-16-0508, 3033-F-17-0508, 3033-F-17-0508-F, 3033-F-18-0508D, 3033-F-18-0508-F, 3033-F-19-0508, 3033-F-19-0508-F, 3033-F-20-0508, 3033-F-20-0508-FD, 3034-F-21-0508, 3034-F-21-0508-F, 3034-F-22-0508, 3034-F-23-0508, 3034-F-23-0508-F, 3034-F-24-0508, and 3034-F-24-0508-F

For the column RTX-CLP, 2,4'-DDE co-eluted with heptachlor epoxide. Consequently, all 2,4'-DDE detected results were reported from the RTX-CLPII column in Table 1A. It is the reviewer's opinion that 2,4'-DDE is present in these samples because 2,4'-DDD, 2,4'-DDT, 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT are also found in the samples.

D. The result for the following analyte is qualified as estimated due to a large percent difference (%D) in a continuing calibration verification (CCV) and is flagged AJ@ in Table 1A.

X 4,4'-DDD in sample 3033-F-16-0508

For the 07/23/08 13:19 CCV, %Ds for 4,4'-DDD (-15.7%), methoxychlor (-15.8%), and 2,4'-DDT (-15.3%) exceeded the $\pm 15\%$ method criterion on columns RTX-CLPII. For analytes with %Ds exceeding criterion on one column only, detected results reported from that column are qualified as estimated. The 4,4'-DDD result in sample 3033-F-16-0508 may be biased low. No methoxychlor and 2,4'-DDT results are qualified since methoxychlor was not detected in the samples and 2,4'-DDT detected results were reported from the RTX-CLP column.

The continuing calibration verification checks and documents satisfactory performance of the instrument over specific time periods during sample analysis.

- E. Results for the following analytes are qualified as estimated due to low laboratory control sample (LCS) recoveries and are flagged AJ@ or “UJ” in Table 1A.
X Endosulfan sulfate, methoxychlor, and endrin aldehyde in all samples

Recoveries of 42%, 33%, and 20% were reported for endosulfan sulfate, methoxychlor, and endrin aldehyde, respectively, in LCS E071608LCS. These values are below the laboratory QC limit of 50-150%. Since qualified results are nondetected, false negatives may exist. The samples were not re-extracted.

Data for LCSs are generated to provide information on the accuracy of the analytical method and laboratory performance.

- F. Matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent differences for dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and endrin aldehyde in QC samples 3033-F-20-0508-MS and 3033-F-20-0508-MSD were outside laboratory QC limits (see attached Form 3s; pp. 69 and 70 in data package). Results reported may indicate poor laboratory technique or matrix effects which may interfere with analysis. Recoveries for 4,4'-DDE and 4,4'-DDD are not meaningful because sample concentrations (82 ug/Kg) are significantly higher than the spike concentration of 10 ug/Kg. Since endrin aldehyde in sample 3033-F-20-0508 is nondetected, a false negative may exist. The effects on data quality for other samples are not known.

Matrix spike sample analysis provides information about the effect of the sample matrix on sample preparation and measurement.

- G. Samples 3033-F-17-0508, 3033-F-18-0508-D, and 3033-F-19-0508 were reanalyzed at 100-fold dilutions due to high levels of 4,4'-DDD that exceeded the calibration range. Results of 4,4'-DDD in these samples are reported from the 100-fold diluted analyses in Table 1A; results for other analytes are reported from the 10-fold diluted analyses.

Sample 3033-F-17-0508-F was reanalyzed at a 5-fold dilution due to high levels of 4,4'-DDD and dieldrin that exceeded the calibration range. Results of these analytes in sample 3033-F-17-0508-F are reported from the diluted analysis in Table 1A; results for other analytes are reported from the undiluted analysis.

Samples 3033-F-18-0508-F and 3033-F-19-0508-F were reanalyzed at 5-fold and 10-fold dilutions, respectively, due to high levels of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin that exceeded the calibration range. Results of 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Samples 3033-F-20-0508 and 3034-F-24-0508 were reanalyzed at 3-fold dilutions due to high levels of 4,4'-DDD and 4,4'-DDE that exceeded the calibration range. Results of 4,4'-DDD and 4,4'-DDE in these samples are reported from the diluted

analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Samples 3033-F-20-0508-FD and 3034-F-22-0508 were reanalyzed at 2-fold dilutions due to high levels of 4,4'-DDE that exceeded the calibration range. Results of 4,4'-DDE in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

Samples 3034-F-21-0508 and 3033-F-23-0508 were reanalyzed at 3-fold dilutions due to high levels of 4,4'-DDD, 4,4'-DDE, and dieldrin that exceeded the calibration range. Results of 4,4'-DDD, 4,4'-DDE, and dieldrin in these samples are reported from the diluted analyses in Table 1A; results for other analytes are reported from the undiluted analyses.

TABLE 1B

DATA QUALIFIER DEFINITIONS FOR ORGANIC DATA REVIEW

The definitions of the following qualifiers are prepared according to the document, "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," July 2007.

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
- L Indicates results which fall below the Contract Required Quantitation Limit. Results are estimated and are considered qualitatively acceptable but quantitatively unreliable due to uncertainties in the analytical precision near the limit of detection.
- J The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- R The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

TABLE 2
Analyte Concentration Summary

Case No.: Not Provided
 SDG No.: 126115
 Site: United Heckathorn
 Laboratory: TestAmerica
 Reviewer: Santiago Lee, ESAT/LDC
 Date: August 27, 2008

<u>Sample</u>	<u>Analyte</u>	Column RTX-CLP <u>Conc., µg/Kg</u>	Column RTX-CLPII <u>Conc., µg/Kg</u>	<u>%D</u>
3033-F-16-0508	2,4'-DDD	1.2	1.7	34
3033-F-16-0508-F	4,4'-DDT	3.5	4.6	27
	2,4'-DDD	0.84	1.1	27
3033-F-19-0508-F	gamma-Chlordane	0.83	7.4	160
3033-F-20-0508	alpha-Chlordane	1.4	0.98	35
3034-F-21-0508	Endrin	3.2	1.1	98
	4,4'-DDT	18	25	33
	gamma-Chlordane	0.94	6.1	150
	alpha-Chlordane	1.7	1.1	43
3034-F-21-0508-F	4,4'-DDT	6.1	8.3	31
3034-F-22-0508	alpha-Chlordane	1.2	0.91	27
3034-F-23-0508	Endrin	3.3	1.6	69
	gamma-Chlordane	1.4	8.2	140
	alpha-Chlordane	2.8	1.8	43
3034-F-23-0508-F	4,4'-DDT	4.6	6.0	26
3034-F-24-0508	4,4'-DDT	20	26	26
	2,4'-DDT	1.1	2.2	67
3034-F-24-0508-F	4,4'-DDT	7.9	11	33



ICF International / Laboratory Data Consultants
Environmental Services Assistance Team, Region 9
1337 South 46th Street, Building 201, Richmond, CA 94804-4698
Phone: (510) 412-2300; Fax: (510) 412-2304.

MEMORANDUM

TO: Sharon Lin, Remedial Project Manager
Site Cleanup Section 2, SFD-7-2

THROUGH: Rose Fong, ESAT Task Order Manager (TOM)
Quality Assurance (QA) Program, MTS-3

FROM: Doug Lindelof, Data Review Task Manager
Region 9 Environmental Services Assistance Team (ESAT)

ESAT Contract No.: EP-W-06-041
Technical Direction Form No.: 00405016 Amendment 2

DATE: August 22, 2008

SUBJECT: Review of Analytical Data, **Tier 2**

Attached are comments resulting from ESAT Region 9 review of the following analytical data:

Site:	United Heckathorn
Site Account No.:	09 R3 QB01
CERCLIS ID No.:	CAD981436363
Case No.:	Not Provided
SDG No.:	126116
Laboratory:	TestAmerica
Analysis:	Organochlorine Pesticides
Samples:	4 Tissue Samples (see Case Summary)
Collection Date:	June 12, 2008
Reviewer:	Santiago Lee, ESAT/Laboratory Data Consultants (LDC)

This report has been reviewed by the EPA TOM for the ESAT contract, whose signature appears above.

If there are any questions, please contact Rose Fong (QA Program/EPA) at (415) 972-3812.

Attachment

SAMPLING ISSUES: Yes No

Data Validation Report - Tier 2

Case No.: Not Provided
SDG No.: 126116
Site: United Heckathorn
Laboratory: TestAmerica
Reviewer: Santiago Lee, ESAT/LDC
Date: August 22, 2008

I. CASE SUMMARY

Sample Information:

Samples: 3034-F-25-0508, 3034-F-25-0508-F, 3034-F-26-0508,
and 3034-F-26-0508-F
Concentration and Matrix: Tissue
Analysis: Organochlorine Pesticides
Method: SW-846 Method 8081A
Collection Date: June 12, 2008
Sample Receipt Date: June 20, 2008
Extraction Date: July 22, 2008
Analysis Date: July 28, 2008

Field QC:

Field Blanks (FB): Not Provided
Equipment Blanks (EB): Not Provided
Background Samples (BG): Not Provided
Field Duplicates (D1): Not Provided

Laboratory QC

Method Blanks & Associated Samples:

MBLK072208A: All samples, 3034-F-25-0508MS, 3034-F-25-0508-
MSD, 3034-F-25-0508-FD, 3034-F-26-0508-D,
EQBLK07, and laboratory control sample (LCS)
A072208LCS

Tables

1B: Data Qualifier Definitions for Organic Data Review
2: Analyte Concentration Summary

Sampling Issues

None.

Additional Comments

As directed by the TOM, Tier 3-level validation of 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, 2,4'-DDT, 2,4'-DDE, 2,4'-DDD, and dieldrin and Tier 1A forms review on the remaining analytes were performed.

Recoveries of endrin aldehyde (79.7%/79.7%) exceeded the laboratory QC limit of 80-120% for the 07/25/08 initial calibration verification (ICV). Since recoveries are only slightly below the QC limit, no adverse effect on data quality is expected.

For duplicate pairs 3034-F-25-0508-F/3034-F-25-0508-FD and 3034-F-26-0508/3034-F-26-0508-D, results for 3034-F-25-0508-F and 3034-F-26-0508 are validated and reported in Table 1A since they have higher surrogate recoveries (see attached Form 2, p. 33 in data package).

The laboratory reported the lower result generated by the two columns, on a wet weight basis, on the Form 1s; results below the reporting limit were not reported (see attached Case Narrative, fifth paragraph on p. 1.2 in data package).

The laboratory generated an “equipment blank”, identified as “EQBLK07”, in order to characterize the homogenization process (see attached Case Narrative, fourth paragraph on p. 1.1 in data package).

This report was prepared in accordance with the following documents:

- X ESAT Region 9 Standard Operating Procedure 902, *Guidelines for Data Review of Contract Laboratory Program Analytical Services (CLPAS) Pesticide/PCB Data Packages*;
- X SW-846 Method 8081A, *Organochlorine Pesticides by Gas Chromatography*, Revision 1, December 1996; and
- X USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, July 2007.

II. VALIDATION SUMMARY

The data were evaluated based on the following parameters:

	<u>Parameter</u>	<u>Acceptable</u>	<u>Comment</u>
1.	Holding Time/Preservation	Yes	
2.	GC Performance	Yes	
3.	Initial Calibration	Yes	
4.	Continuing Calibration Verification	No	C
5.	Laboratory Blanks	Yes	
6.	Field Blanks	N/A	
7.	Surrogates	Yes	
8.	Matrix Spike/Matrix Spike Duplicates	No	D
9.	Laboratory Control Samples/Duplicates	Yes	
10.	Compound Identification	No	A, B
11.	Compound Quantitation	No	A, B
12.	System Performance	Yes	
13.	Field Duplicate Sample Analysis	N/A	

N/A = Not Applicable

III. VALIDITY AND COMMENTS

- A. Detected results for the following analyte are considered presumptively identified and estimated due to confirmation problems and are flagged "NJ" in Table 1A.

X 4,4'-DDT in samples 3034-F-25-0508-F, 3034-F-26-0508, and 3034-F-26-0508-F

The percent differences (%D) in calculated concentrations between the RTX-CLP column and the RTX-CLP2 column ($\text{concentration}_a - \text{concentration}_b / \text{average concentration}$) exceeded the validation QC limit of 25.0% for analytes listed above (see Table 2).

The laboratory reported the lower concentrations and they are presented in Table 1A. It is the opinion of the reviewer that, due to the large %Ds between results quantitated from the two columns, it is questionable whether the presence of the analyte listed above can be considered confirmed in the samples. Data users should note that these results are both qualitatively and quantitatively questionable.

- B. The detected result for the following analyte is considered presumptively identified and estimated due to a resolution problem and is flagged ANJ@ in Table 1A.

X Heptachlor epoxide in sample 3034-F-25-0508

For the column RTX-CLP, heptachlor epoxide co-eluted with 2,4'-DDE. Consequently, the heptachlor epoxide detected result in sample 3034-F-25-0508 was reported from the RTX-CLPII column in Table 1A. Data users should note that the result for heptachlor epoxide in this sample is both qualitatively and quantitatively questionable.

- C. Results for the following analyte are qualified as estimated due to a large percent difference (%D) in continuing calibration verification (CCV) and are flagged AJ@ or "UJ" in Table 1A.

X 4,4'-DDD in samples 3034-F-25-0508, 3034-F-26-0508, 3034 F-25-0508F and 3034-F-26-0508-F

Some analytes exceeded the $\pm 15\%$ D method criterion for the 07/28/08 10:01 CCV on column RTX-CLPII (see attached Form 7; p. 117 in data package). For analytes with %Ds exceeding criterion on one column only, detected results reported from that column are qualified as estimated. Qualified detected results may be biased low.

The continuing calibration verification checks and documents satisfactory performance of the instrument over specific time periods during sample analysis.

- D. Matrix spike/matrix spike duplicate (MS/MSD) recoveries for 4,4'-DDD and endrin aldehyde and the relative percent difference for 4,4'-DDD in QC samples 3034-F-25-0508-MS and 3034-F-25-0508-MSD were outside laboratory QC limits (see attached Form 3s; pp. 34 and 35 in data package). Results reported may indicate poor laboratory technique or matrix effects which may interfere with analysis. The detected result for 4,4'-DDD in sample 3034-F-25-0508 may be biased low. Since endrin aldehyde in sample 3034-F-25-0508 is nondetected, a false negative may exist. The effects on data quality for other samples are not known.

Matrix spike sample analysis provides information about the effect of the sample matrix on sample preparation and measurement.

TABLE 1B

DATA QUALIFIER DEFINITIONS FOR ORGANIC DATA REVIEW

The definitions of the following qualifiers are prepared according to the document, "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," July 2007.

- U The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted Contract Required Quantitation Limit (CRQL) for sample and method.
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- J The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ The analyte was not detected at a level greater than or equal to the adjusted CRQL. However, the reported adjusted CRQL is approximate and may be inaccurate or imprecise.
- R The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.

TABLE 2
Analyte Concentration Summary

Case No.: Not Provided
 SDG No.: 126116
 Site: United Heckathorn
 Laboratory: TestAmerica
 Reviewer: Santiago Lee, ESAT/LDC
 Date: August 22, 2008

<u>Sample</u>	<u>Analyte</u>	Column RTX-CLP <u>Conc., µg/Kg</u>	Column RTX-CLPII <u>Conc., µg/Kg</u>	<u>%D</u>
3034-F-25-0508-F	4,4'-DDT	2.6	4.7	58
3034-F-26-0508	4,4'-DDT	3.1	5.0	47
3034-F-26-0508-F	4,4'-DDT	1.1	1.8	48