CITY OF PORTLAND
ENVIRONMENTAL SERVICES
1120 SW Fifth Avenue, Room 1000, Portland, Oregon 97204-1912 ▪ Sam Adams, Commissioner ▪ Dean Marriott, Director

TECHNICAL MEMORANDUM No. OF22B-3

City Outfall Basin 22B
Inline Solids Evaluation

TO: Karen Tarnow, Oregon Department of Environmental Quality (DEQ)

FROM: Dawn Sanders, City of Portland, Bureau of Environmental Services (BES)
Linda Scheffler, BES

COPIES: Kristine Koch, Environmental Protection Agency (EPA)
Julia Fowler, GSI Water Solutions, Inc.

DATE: January 22, 2008

SUBJECT: **Portland Harbor Source Control Investigation**

Introduction

This technical memorandum presents an evaluation and comparison of analytical data sets for inline solids samples collected during stormwater conveyance system cleanout activities conducted in 2004 and 2006 in Outfall Basin 22B. Select metals, pesticides, and polycyclic aromatic hydrocarbons (PAHs) were detected at concentrations greater than Joint Source Control Strategy (JSCS) bioaccumulation and/or toxicity screening level values (SLVs) (DEQ/EPA, 2005) in solids samples from the 2004 line cleanout. The concentrations of these contaminants in the solids samples collected during the 2006 line cleanout were reduced and, for all but one PAH compound, were less than JSCS toxicity SLVs. Overflows from former East Doane Lake and/or releases from the Gould Inc. Superfund site before and during the completion of remedial actions in 2000 were a significant source of these contaminants detected in 2004. The comparison of these two data sets indicates that the 2004 line cleanout resulted in the removal of many contaminants associated with legacy releases to the Outfall Basin 22B stormwater conveyance system and that an ongoing significant source to the City's conveyance system has been controlled.

Background

The area currently served by the Outfall 22B stormwater conveyance system has a long history of industrial use. All the properties within or historically connected to the outfall basin are DEQ ECSI sites: Gould (also an EPA Superfund site), Arkema, Rhone Poulenc, Schnitzer – Doane Lake, and Metro Central Transfer Station (Figure 1). Additionally, between 1980 and 2000, former East Doane Lake (located on and by the Gould and Schnitzer sites) overflowed when the lake elevation was high, into a catch basin connected to Basin 22B.

The principal contaminants of concern (COC) and stormwater pathways identified at these sites are as follows:

Arkema. The principal COC include 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, and chlorobenzene. Additional COC include chloride, perchlorate, hexavalent chromium, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs). An undetermined portion of the Arkema site discharged to Outfall Basin 22B via piped connections to the adjacent right-of-way swale conveyance line until 2006 when the connections were abandoned. Surface runoff from the site may still be discharging to the swale and subsequently to the City's stormwater system.

Gould/Former East Doane Lake. Lead was the primary COC for the Gould site. The former East Doane Lake was located on and in the vicinity of the Gould site. Other COC identified for Gould and former East Doane Lake include additional metals (arsenic, cadmium, chromium and zinc), herbicides, pesticides, PCBs, dioxins/furans, VOCs and phenols. Operations at Gould ceased in 1981 but overflow from the East Doane Lake area discharged into the City's system until remedial actions at the site were completed in 2000. The only current connection to the public storm sewer is from a french drain associated with the onsite containment facility; runoff from the vegetated cap discharges to the storm sewer along Front Avenue.

The 2000 remedial action consisted of the excavation and encapsulation of a significant volume of contaminated material. City staff observed site soils entering the drain during remediation.

Rhone Poulenc. COC identified for the property include herbicides, pesticides, dioxins and furans, lead, SVOCs and VOCs. This property is not within Outfall Basin 22B but contaminated groundwater is infiltrating into the Outfall 22B conveyance system. StarLink Logistics, Inc. (SLLI), the current owner, initiated an interim source control action in 2006 to eliminate infiltration of groundwater into the public stormwater conveyance system.

Schnitzer – Doane Lake. Known or potential COC identified for this site include VOCs, PCBs, petroleum hydrocarbons and metals. This facility discharged to East Doane Lake until a connection was made to the City's storm system in 2000.

Metro Central Transfer Station. The results of a site investigation indicated that groundwater was contaminated with pesticides, herbicides, VOCs and metals. The contamination is believed to come from the upgradient Rhone Poulenc site (DEQ, 1995). This facility connected to the City's storm system in 1991.

The City collected inline solids samples before (in September 2003) and during a May 2004 stormwater line cleanout project in Outfall Basin 22B. Subsequent to the City's 2004 cleanout, SLLI collected inline solids samples while cleaning and sealing portions of the Basin 22B conveyance system as part of the interim source control action initiated in June 2006. The sampling results are discussed here and summarized in Table 1.

2003/2004 Solids Sampling Conducted by the City

Before cleaning the stormwater line, the City collected an inline solids grab sample on September 30, 2003, downstream of manhole AAJ639 (manhole MH-3 on Figure 1), for waste characterization purposes. Arsenic, cadmium, lead, mercury, and selenium were detected in the sample at concentrations greater than JSCS SLVs for toxicity and/or bioaccumulation. Pesticides,

PCBs and PAHs were not detected in this sample; however, a number of the detection limits were greater than JSCS SLVs.

The City cleaned a portion of the Basin 22B system on May 14, 2004. The cleaning project originated near the Guilds Lake Pump Station, extended east to Outfall 22B and included the line that flows northwest past the pump station and the pump station emergency bypass line. The City collected a composite sample of the stockpiled material removed from the lines and submitted it for laboratory analyses.

Arsenic, cadmium, lead, mercury, zinc, 4,4'-DDD, 4,4'-DDE 4,4'-DDT, alpha-chlordane, dieldrin and six PAH compounds were detected at concentrations greater than JSCS toxicity and/or bioaccumulation SLVs. PCBs were not analyzed. Analytical reports and field notes for this sample are provided in the *Outfall 22B Storm Line Solids Investigation Data Report* (CH2M HILL, 2004), which is included as Attachment 1.

2006 SLLI Line Cleanout and Sampling

SLLI conducted camera surveys of the Basin 22B stormwater lines and then removed solids from the system in 2006. Solids removed from the lines were segregated into two containers based on visual differences observed between inline solids removed upstream and downstream of manhole MH-5 (manhole AAJ645). Two samples were collected from the containerized solids on November 8, 2006. These data were provided to the City as required by the access agreement and to our knowledge, have not been previously evaluated in a report.

Metals were detected in solids samples from upstream and downstream of manhole MH-5. No metals were detected at concentrations greater than JSCS toxicity SLVs. Arsenic, lead, and mercury were detected at concentrations greater than the JSCS bioaccumulation SLVs.

Four pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT and dieldrin) were detected in the upstream solids sample; the concentrations of these pesticides are greater than their respective JSCS bioaccumulation SLVs but less than toxicity SLVs. Pesticides were not detected in the downstream solids sample but the detection limits were elevated and exceeded the concentrations detected in the upstream sample.

One PAH compound [indeno(1,2,3-cd)pyrene] was detected at a concentration greater than the JSCS toxicity SLV in both samples.

Comparison of Data Sets

Not all metals analyzed in 2003/2004 were analyzed in 2006. For those metals with results for the two time periods, the 2006 concentrations are less than those detected in the 2003/2004 solids samples, with the exception of chromium. Chromium was detected at about the same concentration as detected in the City's two samples. The concentration of lead was much lower in the 2006 sample than in the 2003/2004 samples. All 2006 metals concentrations were below the JSCS toxicity SLVs.

For those pesticides that were detected in the 2006 upstream sample, the concentrations of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT are less than the concentrations detected in the 2004 cleanout composite sample. The concentration of dieldrin is slightly higher in the 2006 sample. All 2006 pesticide concentrations were below the JSCS toxicity SLVs.

In general, the concentrations of PAHs detected in the 2006 samples were less than those detected in the 2004 cleanout composite sample.

Conclusions

The 2003/2004 inline solids data set represents accumulated solids discharged to the system before the 2004 cleanout, including discharges from Gould/former East Doane Lake before and during site remediation activities completed in 2000. Before the 2004 cleanout, many contaminant concentrations were greater than JSCS toxicity SLVs. The 2006 data set indicates that all contaminant concentrations with the exception of one PAH are now less then JSCS toxicity SLVs. Three metals (arsenic, lead and mercury), 4,4'-DDD, 4,4'-DDE, 4,4'-DDT and dieldrin are present at concentrations greater than JSCS bioaccumulation SLVs. Even though many of these contaminants have been identified as COCs at other cleanup sites within and in the vicinity of Basin 22B, the reduction in the concentrations of all constituents (except chromium and dieldrin) indicates that an ongoing significant source to the City's system has been controlled. The most significant source control that would have affected inline solids quality in Basin 22B, between 2003 and 2006, was the completion of the Gould/East Doane Lake remedial action. Therefore, the comparison of the two inline solids data sets supports a conceptual model of legacy releases to the Basin 22B stormwater conveyance system from former East Doane Lake overflows and/or discharges from the Gould site before and during site remedial activities.

With regard to the ongoing presence of pesticides in the City's stormwater conveyance system, the completion of interim remedial actions by SLLI is anticipated to mitigate the intrusion of pesticide-contaminated groundwater to the conveyance system. Additionally, DEQ is currently working with Arkema to determine if surface runoff from the site discharges to the City's conveyance system via the right-of-way swale.

Several sampling events have recently occurred or are planned in Basin 22B. These activities include stormwater and solids sampling conducted by the Lower Willamette Group during the spring and fall of 2007. Additionally, following completion of their interim remedial measures in 2007, SLLI collected dry-weather flow samples from the City conveyance system to evaluate the efficacy of sealing portions of the Outfall 22B conveyance system to prevent contaminated groundwater intrusion. The City has also deployed sediment traps in the upper portion of the basin for the winter 2008 storm season. The City will evaluate these data to determine if additional source tracing or source control activities are warranted.

References

CH2M HILL. 2004. *Outfall 22B Storm Line Solids Investigation Data Report*. Technical Memorandum prepared for the City of Portland, Bureau of Environmental Services, August 5, 2004.

DEQ. 1995. DEQ Site Summary Report – Details for ECSI Site No. 1398. DEQ Environmental Cleanup Site Database (ECSI). Accessed June 2007. http://www.deq.state.or.us/lq/ecsi/ecsidetail.asp?seqnbr=1398

DEQ/EPA. 2005. *Portland Harbor Joint Source Control Strategy*, Final, dated December 2005, as amended July 2007.

Figure

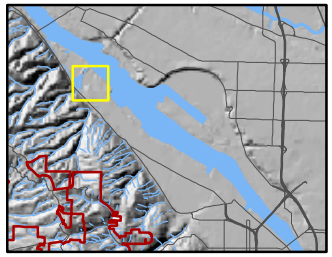
Figure 1 – Outfall Basin 22B, Overview Location Map

Table

Table 1 – Summary of Chemical Analytical Results, Solids Samples, City Outfall Basin 22B

Attachment

Attachment 1 – *Outfall 22B Storm Line Solids Investigation Data Report* (CH2M HILL, 2004)



Legend

- Storm Inlets
- Storm Pipe
- Manhole
- Taxlots
- 22B Basin Boundary
- Environmental Cleanup Site (ECSI)

0 125 250 500 Feet

Figure 1
Outfall Basin 22B
Overview Location Map

Source: City of Portland BES Aerial photo 2006	Environmental Services City of Portland 1120 SW Fifth Avenue, Room 1000 Portland Oregon, 97204-3912
File Name: s:\gis\outfalls\outfalls_22b\of22b_cb.mxd	Program Manager: Dawn Sanders Portland Harbor Superfund
Sheet No. 1 OF 1	Date Printed: 01/09/07 Prepared by: Sara Gardner

Table 1
Summary of Chemical Analytical Results
Solids Samples
City Outfall Basin 22B

Class	Analyte	Units	Inline Solids: Waste Characterization Grab[1] FO030981 09/30/03	Inline Solids: Cleanout Composite[2] IL-22B-CM-051404-0 05/14/04	Inline Solids: Manhole AAJ645[3] (Upstream of MH-5) IDW-270 11/08/06	Inline Solids: Manhole AAJ645[3] (Downstream of MH-5) IDW-271 11/08/06	JSCS SLVs[4] Toxicity	JSCS SLVs[4] Bioaccumulation	DEQ Default Background Concentrations in Soil[5]
Metals									
	Antimony	mg/Kg	NA	1.13	NA	NA	64	--	--
	Arsenic	mg/Kg	**56**	**25.5**	**10.8**	**11.6**	33	7	7
	Barium	mg/Kg	392	NA	59.4	85.1	--	--	--
	Cadmium	mg/Kg	**5.35**	**2.64**	0.552 U	0.61	4.98	1	1
	Chromium	mg/Kg	99.9	83.2	66.4	90.5	111	--	42
	Copper	mg/Kg	NA	74.5	NA	NA	149	--	36
	Lead	mg/Kg	**452**	**180**	**77.5**	**80.8**	128	17	17
	Mercury	mg/Kg	**2.65**	**0.703**	**0.127**	**0.103**	1.06	0.07	0.07
	Selenium	mg/Kg	**3.15**	NA	0.602	0.604 U	5	2	2
	Silver	mg/Kg	1.6	NA	0.552 U	0.604 U	5	--	1
	Zinc	mg/Kg	NA	529	NA	NA	459	--	86
Pesticides/PCBs[6]									
	4,4'-DDD	µg/Kg	*98.7* U	**51.9** DP2	**16.2**	*18.9* U	28	0.33	--
	4,4'-DDE	µg/Kg	*98.7* U	**14.2** P	**7.83**	*9.74* U	31.3	0.33	--
	4,4'-DDT	µg/Kg	*98.7* U	**107** D	**9.69**	*67* U	62.9	0.33	--
	Total DDT[7]	µg/Kg	ND	**173.1**	**33.72**	ND	--	0.33	--
	Aldrin	µg/Kg	*98.7* U	1.85 P	1.15 U	3.05 U	40	--	--
	Alpha-BHC	µg/Kg	98.7 U	1.79 P2	1.15 U	3.05 U	--	--	--
	Alpha-Chlordane[8]	µg/Kg	*98.7* U	**5.42** 2	*3* U	*7.92* U	17.6	0.37	--
	Beta-BHC	µg/Kg	98.7 U	1.58 P2	1.62 U	3.05 U	--	220	--
	Delta-BHC	µg/Kg	98.7 U	1.88 P2	2.31 U	6.09 U	--	--	--
	Dieldrin	µg/Kg	*98.7* U	**3.17** P2	**9.34**	*10.4* U	61.8	0.0081	--
	Endosulfan I	µg/Kg	98.7 U	4.62 2	1.15 U	3.05 U	--	--	--
	Endosulfan II	µg/Kg	98.7 U	2.95 P2	1.15 U	4.87 U	--	--	--
	Endosulfan Sulfate	µg/Kg	98.7 U	0.84 P2	1.15 U	3.05 U	--	--	--
	Endrin	µg/Kg	98.7 U	3.55 P	3.93 U	9.14 U	207	--	--
	Endrin Aldehyde	µg/Kg	98.7 U	221 D	1.15 U	18.3 U	--	--	--
	Endrin Ketone	µg/Kg	98.7 U	4.21 U	1.15 U	49.9 U	--	--	--
	Gamma-BHC(Lindane)	µg/Kg	*98.7* U	1.26 P2	1.62 U	4.26 U	4.99	--	--
	Gamma-Chlordane	µg/Kg	98.7 U	8.83 P	3.23 U	13.4 U	--	--	--
	Heptachlor	µg/Kg	*98.7* U	4.57 J2	2.31 U	6.09 U	10	--	--
	Heptachlor Epoxide	µg/Kg	*98.7* U	8.99 P2	2.54 U	9.14 U	16	--	--
	Methoxychlor	µg/Kg	98.7 U	NA	3 U	29.8 U	--	--	--
	PCB 1016	µg/Kg	395 U	NA	11.5 U	122 U	530	--	--
	PCB 1221	µg/Kg	395 U	NA	23.1 U	244 U	--	--	--
	PCB 1232	µg/Kg	592 U	NA	11.5 U	122 U	--	--	--
	PCB 1242	µg/Kg	395 U	NA	11.5 U	122 U	--	--	--
	PCB 1248	µg/Kg	592 U	NA	11.5 U	122 U	1500	--	--
	PCB 1254	µg/Kg	*790* U	NA	11.5 U	122 U	300	--	--
	PCB 1260	µg/Kg	*395* U	NA	11.5 U	122 U	200	--	--
	Total PCBs	µg/Kg	ND	NA	ND	ND	676	0.39	--
	Toxaphene	µg/Kg	2950 U	210 U	NA	NA	--	--	--

Class	Analyte	Units	Inline Solids: Waste Characterization Grab[1] FO030981 09/30/03	Inline Solids: Cleanout Composite[2] IL-22B-CM-051404-0 05/14/04	Inline Solids: Manhole AAJ645[3] (Upstream of MH-5) IDW-270 11/08/06	Inline Solids: Manhole AAJ645[3] (Downstream of MH-5) IDW-271 11/08/06	JSCS SLVs[4] Toxicity	JSCS SLVs[4] Bioaccumulation	DEQ Default Background Concentrations in Soil[5]
Polynuclear Aromatic Hydrocarbons									
	2-Methylnaphthalene	µg/Kg	NA	20.9	NA	NA	200	--	--
	Acenaphthene	µg/Kg	*9730* U	221	31 U	32.3 U	300	--	--
	Acenaphthylene	µg/Kg	*9730* U	14.6	31 U	32.3 U	200	--	--
	Anthracene	µg/Kg	*9730* U	254	31 U	44.9	845	--	--
	Benzo(a)anthracene	µg/Kg	*9730* U	1410 D	136	167	1050	--	--
	Benzo(a)pyrene	µg/Kg	*9730* U	1840 D	248	228	1450	--	--
	Benzo(b)fluoranthene	µg/Kg	9730 U	1390 D	191	211	--	--	--
	Benzo(g,h,i)perylene	µg/Kg	*9730* U	1180 D	203	187	300	--	--
	Benzo(k)fluoranthene	µg/Kg	9730 U	1490 D	188	198	13000	--	--
	Chrysene	µg/Kg	*9730* U	1810 D	210	248	1290	--	--
	Dibenzofuran	µg/Kg	9730 U	47.2	NA	NA	--	--	--
	Dibenzo(a,h)anthracene	µg/Kg	*9730* U	373	52.1	56.9	1300	--	--
	Fluoranthene	µg/Kg	*9730* U	2140 D	224	381	2230	37000	--
	Fluorene	µg/Kg	*9730* U	110	31 U	32.3 U	536	--	--
	Indeno(1,2,3-cd)pyrene	µg/Kg	*9730* U	1120 D	173	152	100	--	--
	Naphthalene	µg/Kg	*9730* U	42.7	31 U	32.3 U	561	--	--
	Phenanthrene	µg/Kg	*9730* U	939 D	80.3	169	1170	--	--
	Pyrene	µg/Kg	*9730* U	**2030** D	229	370	1520	1900	--

Notes:

[1] Sample collected by the City for waste characterization purposes prior to line cleaning.
[2] Composite sample collected by the City following line cleaning.
[3] Sample collected by Starlink Logistics, Inc. following stormwater line cleanout.
[4] Joint Source Control Strategy (JSCS) Screening Level Values (SLVs) (DEQ/EPA Final December 2005).
[5] DEQ Environmental Cleanup Program Memorandum to Cleanup Project Manager, Default Background Metal Concentrations in Soil. October 28, 2002.
[6] Inline solids sample FO030981 was analyzed for PAHs by 8270B. The remaining samples were analyzed using 8270SIM.
[7] This value reprepents the sum of DDD, DDE and DDT.
[8] SLV is for total chlordane.

µg/kg = micrograms per kilogram
mg/kg = miligrams per kilogram
-- = not established
U = The analyte was analyzed for, but the analyte was not detected above the reported sample quantitation limit
D = Analyte has been run at a dilution to bring the concentration of that compound within the linear range of the instrument.
P = The primary and confirmation analyte result recoveries do not match. When the RPD between the primary and confirmation result was less than 40%, the highest value was reported.
2 = Confirmation result was used.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NA = not analyzed.
ND = not detected
shaded = The detected concentration exceeds JSCS Toxicity SLV
bold = The detected concentration exceeds JSCS Bioaccumulation SLV
italics = The method reporting limit exceeds JSCS SLVs for bioaccumulation and/or toxicity

ATTACHMENT 1

Outfall 22B Storm Line Solids Investigation Data Report

Outfall 22B Storm Line Solids Investigation Data Report

PREPARED FOR: Dawn Sanders/City of Portland

PREPARED BY: CH2M HILL

DATE: August 5, 2004

1.0 Introduction

This memorandum presents a summary of field activities, field observations, and analytical data associated with the collection of inline solids from a storm line located in Basin 22B. This work was conducted in coordination with a storm line maintenance cleanout planned by the City of Portland's Operations and Maintenance (O&M) staff.

The storm line cleanout project was located near 6400 NW Front Avenue in a 48-inch storm line loop northwest of the street. Inline solids material was removed from about 1,200 feet of existing 48-inch-diameter storm pipe that was approximately 1/4 full of debris. The cleaning project originated at the Guilds Lake Pump Station and ended at Outfall 22B at the Willamette River. This portion of the 22B conveyance system receives stormwater runoff from NW Front Avenue as well as from other upland areas.

1.1 Previous Sampling

The City collected one inline solids sample from the 48-inch storm line for the purpose of waste characterization. This sample was collected at the downstream end of the 48-inch line at node AAJ639 (approximately 500 feet upstream of Outfall 22B). The sample was analyzed for total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), toxicity characteristic leaching procedure (TCLP) metals (chromium and lead), total petroleum hydrocarbons (TPH), herbicides, pesticides, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs). Sample analysis was conducted by the City of Portland Water Pollution Control Laboratory. As shown in Attachment A, results indicated high concentrations of metals. Matrix interference and elevated levels of motor oil range hydrocarbons in the sample resulted in method reporting levels significantly higher than the sediment screening levels for herbicides, SVOCs, and pesticides/PCBs. The waste characterization sample is not discussed in this memorandum.

1.2 Additional Sampling

Because of the high metal concentrations and elevated organic compound detection limits associated with the waste characterization sample, the City decided to conduct additional sampling to characterize the solids in the 48-inch pipe. The Oregon Department of Environmental Quality (DEQ) was notified of the additional sampling and consulted on the analyte list prior to sample collection. After the cleanout of the 48-inch pipe was completed,

a composite sample of the stockpiled solids material was collected on May 14, 2004. Sampling was conducted in accordance with the *Sampling and Analysis Plan – Inline Solids in Basins M-1 and 18* (SAP) (CH2M HILL, August 2003).

The composite sample was analyzed for total metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, and zinc), pesticides, polynuclear aromatic hydrocarbons, (PAHs), total petroleum hydrocarbons–diesel (TPH-Dx), and total organic carbon (TOC). Sample analysis was conducted by the CH2M HILL Applied Sciences Laboratory. Laboratory methods and target detection limits were presented in the Laboratory Statement of Work (Attachment B).

2.0 Storm Line Solids Investigation

This section presents field observations and analytical results for the composite sample collected from the stockpiled material removed from the Basin 22B storm line.

2.1 Field Observations

Field observations for the composite sample are presented in Table 1. The table shows the sample identification (ID) number and location, solids description, and comments. Observations were recorded by a representative of CH2M HILL in a field notebook (Attachment C).

Table 1
Basin 22b Inline Solids Sampling Observations

Sample ID/Location	Solids Description	Comments
IL-22B-CM-051404-0 Composite sample collected from drain pad.	SILT WITH SAND, black, wet, moderate sheen, 50% silt, 50% sand, large amount of foreign debris (e.g., gloves, plastic bottles, styro foam packaging), 1% organic matter.	A 16-point composite sample was collected from a 40-foot by 40-foot drain pad. At each location, a sample core was taken through the entire column depth and composited. Cleanout solids were approximately 1 to 2 feet deep across the entire pad, with a 3-foot mound in the southwest corner. A mild sheen was observed during mixing.

2.2 Analytical Data Results

Analytical data results for the composite sample (IL-22B-CM-051404-0) are summarized in Table 2 of this memorandum. Corresponding laboratory data sheets and a data validation report are presented in Attachments D and E, respectively. Data were validated in accordance with the guidelines contained in the U.S. Environmental Protection Agency (EPA) documents *National Functional Guidelines for Organic Data Review* (October 1999) and *National Functional Guidelines for Inorganic Data Review* (July 2002).

Table 2
Analytical Results for Basin 22B Composite Sample

Class/Analyte	Units	IL-22B-CM-051404-0	
Total Metals:			
Antimony	mg/kg	1.13	
Arsenic	mg/kg	25.5	
Cadmium	mg/kg	2.64	
Chromium	mg/kg	83.2	
Copper	mg/kg	74.5	
Lead	mg/kg	180	
Mercury	mg/kg	0.703	
Zinc	mg/kg	529	
Pesticides:			
4,4-DDD	µg/kg	51.9	DP2
4,4-DDE	µg/kg	14.2	P
4,4-DDT	µg/kg	107	D
4,4-Methoxychlor	µg/kg	22.2	P
Aldrin	µg/kg	1.85	P
Alpha-BHC	µg/kg	1.79	P2
beta-BHC	µg/kg	1.58	P2
Beta-Chlordane	µg/kg	8.83	P
cis-Chlordane	µg/kg	5.42	2
cis-Nonachlor	µg/kg	4.60	JP
delta-BHC	µg/kg	1.88	P2
Dieldrin	µg/kg	3.17	P2
Endosulfan I	µg/kg	4.62	2
Endosulfan II	µg/kg	2.95	P2
Endosulfan Sulfate	µg/kg	0.84	P2
Endrin	µg/kg	3.55	P
Endrin Aldehyde	µg/kg	221	D
Endrin Ketone	µg/kg	4.21	U

Table 2
Analytical Results for Basin 22B Composite Sample

Class/Analyte	Units	IL-22B-CM-051404-0	
Heptachlor	µg/kg	4.57	J2
Heptachlor Epoxide	µg/kg	8.99	P2
Lindane	µg/kg	1.26	P
Oxychlordane	µg/kg	1.31	JP
Toxaphene	µg/kg	210	U
Trans-Nonachlor	µg/kg	16.5	JP2
Polynuclear Aromatic Hydrocarbons:			
1-Methylnaphthalene	µg/kg	12.8	J
2-Methylnaphthalene	µg/kg	20.9	
Acenaphthene	µg/kg	221	
Acenaphthylene	µg/kg	14.6	
Anthracene	µg/kg	254	
Benzo (a) anthracene	µg/kg	1,410	D
Benzo (a) pyrene	µg/kg	1,840	D
Benzo (b) fluoranthene	µg/kg	1,390	D
Benzo (g,h,i) perylene	µg/kg	1,180	D
Benzo (k) fluoranthene	µg/kg	1,490	D
Chrysene	µg/kg	1,810	D
Dibenzofuran	µg/kg	47.2	
Dibenzo (a, h) anthracene	µg/kg	373	
Fluoranthene	µg/kg	2,140	D
Fluorene	µg/kg	110	
Indeno (1,2,3-cd) pyrene	µg/kg	1,120	D
Naphthalene	µg/kg	42.7	
Phenanthrene	µg/kg	939	D
Pyrene	µg/kg	2,030	D
Estimated Total LPAHs[1]	µg/kg	1,602	D
Estimated Total HPAHs[1,2]	µg/kg	14,783	D

Table 2
Analytical Results for Basin 22B Composite Sample

Class/Analyte	Units	IL-22B-CM-051404-0	
Estimated Total PAHs[1,3]	µg/kg	16,385	D
Petroleum Hydrocarbons—Dx:			
Diesel	mg/kg	216	J
Lube Oil	mg/kg	747	J
Total Organic Carbon:			
Total Organic Carbon	mg/kg	19,200	

Abbreviations/Definitions:

HPAH = high molecular weight polynuclear aromatic hydrocarbons
LPAH = low molecular weight polynuclear aromatic hydrocarbons
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PAH = polynuclear aromatic hydrocarbon

[1] Total parameters (i.e., LPAHs, HPAHs, PAHs) were calculated based on detections only. Qualifiers are not included in the total parameters as it is implied that these are estimated quantities.
[2] Total LPAHs: Includes naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, and 2-methylnaphthalene.
[3] Total HPAHs: Includes fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzofluoranthenes, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, dibenzo(a,h)anthracene and benzo[g,h,I]perylene.
[4] Total PAHs: Represents the sum of Total LPAHs and HPAHs.

Qualifiers:

D = Analyte has been run at a dilution to bring the concentration of that compound within the linear range of the instrument.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
P = The primary and confirmation analyte result recoveries do not match. When the relative percent difference (RPD) between the primary and confirmation result was less than 40%, the highest value was reported (assumes both peaks are from target). When the RPD was greater than 40%, the lowest value was reported (assumes the reason for large RPD is an interfering compound).
U = The analyte was analyzed for, but the analyte was not detected above the reported sample quantitation limit.
2 = Confirmation result was used.

ATTACHMENT A
Laboratory Data Sheets for the Waste Determination Sample

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Page: 1

Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639

Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017

Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method
RCRA METALS (8) BY EPA 6020				
ARSENIC	56.0	mg/Kg	0.50	EPA 6020
BARIUM	392	mg/Kg	0.10	EPA 6020
CADMIUM	5.35	mg/Kg	0.10	EPA 6020
CHROMIUM	99.9	mg/Kg	0.50	EPA 6020
LEAD	452	mg/Kg	0.10	EPA 6020
MERCURY	2.65	mg/Kg	0.010	EPA 6020
SELENIUM	3.15	mg/Kg	1.00	EPA 6020
SILVER	1.60	mg/Kg	0.10	EPA 6020
TCLP METALS - 2				
CHROMIUM	<0.0100	mg/L	0.0100	EPA 1311
LEAD	0.0303	mg/L	0.0050	EPA 1311
NWTPH-Dx				
#6 FUEL OIL	<500	mg/Kg	500	NWTPH-Dx
DIESEL	<250	mg/Kg	250	NWTPH-Dx
KEROSENE	<250	mg/Kg	250	NWTPH-Dx
MOTOR OIL	11300	mg/Kg	500	NWTPH-Dx
NWTPH-HCID				
DIESEL	<50	mg/Kg	50	NWTPH-HCID
GASOLINE	DET	mg/Kg	20	NWTPH-HCID
HEAVY FUEL OIL	<100	mg/Kg	100	NWTPH-HCID
LUBE OIL	DET	mg/Kg	100	NWTPH-HCID
OTHER	<100	mg/Kg	100	NWTPH-HCID
Surrogate Recovery (%)	103	mg/Kg		NWTPH-HCID
HERBICIDES				
2,4,5-T	<2.29	mg/Kg	2.29	EPA 8150
2,4,5-TP (Silvex)	<2.29	mg/Kg	2.29	EPA 8150

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656

Report Date: 10/8/2003

Validated By: Signature on File

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Page: 2

Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639

Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017

Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method
2,4-D	<2.29	mg/Kg	2.29	EPA 8150
2,4-DB	<2.29	mg/Kg	2.29	EPA 8150
Dalapon	<4.58	mg/Kg	4.58	EPA 8150
Dicamba	<2.29	mg/Kg	2.29	EPA 8150
Dichlorprop	<2.29	mg/Kg	2.29	EPA 8150
Dinoseb	<2.29	mg/Kg	2.29	EPA 8150
MCPA	<229	mg/Kg	229	EPA 8150
MCPP	<229	mg/Kg	229	EPA 8150
Pentachlorophenol	<2.29	mg/Kg	2.29	EPA 8150
NWTPH-Gx				
GASOLINE RANGE HYDROCARBONS	<11.8	mg/Kg	11.8	NWTPH-Gx
PESTICIDES/PCB'S BY EPA 8081				
4,4'-DDD	<98.7	µg/Kg	98.7	EPA 8081
4,4'-DDE	<98.7	µg/Kg	98.7	EPA 8081
4,4'-DDT	<98.7	µg/Kg	98.7	EPA 8081
Aldrin	<98.7	µg/Kg	98.7	EPA 8081
Alpha-BHC	<98.7	µg/Kg	98.7	EPA 8081
Alpha-Chlordane	<98.7	µg/Kg	98.7	EPA 8081
Beta-BHC	<98.7	µg/Kg	98.7	EPA 8081
Chlordane(tech)	<2210	µg/Kg	2210	EPA 8081
Delta-BHC	<98.7	µg/Kg	98.7	EPA 8081
Dieldrin	<98.7	µg/Kg	98.7	EPA 8081
Endosulfan I	<98.7	µg/Kg	98.7	EPA 8081
Endosulfan II	<98.7	µg/Kg	98.7	EPA 8081
Endosulfan Sulfate	<98.7	µg/Kg	98.7	EPA 8081
Endrin	<98.7	µg/Kg	98.7	EPA 8081
Endrin Aldehyde	<98.7	µg/Kg	98.7	EPA 8081
Endrin Ketone	<98.7	µg/Kg	98.7	EPA 8081

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639

Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017

Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method
Gamma-BHC(Lindane)	<98.7	µg/Kg	98.7	EPA 8081
Gamma-Chlordane	<98.7	µg/Kg	98.7	EPA 8081
Heptachlor	<98.7	µg/Kg	98.7	EPA 8081
Heptachlor Epoxide	<98.7	µg/Kg	98.7	EPA 8081
Methoxychlor	<98.7	µg/Kg	98.7	EPA 8081
PCB 1016	<395	µg/Kg	395	EPA 8081
PCB 1221	<395	µg/Kg	395	EPA 8081
PCB 1232	<592	µg/Kg	592	EPA 8081
PCB 1242	<395	µg/Kg	395	EPA 8081
PCB 1248	<592	µg/Kg	592	EPA 8081
PCB 1254	<790	µg/Kg	790	EPA 8081
PCB 1260	<395	µg/Kg	395	EPA 8081
Toxaphene	<2950	µg/Kg	2950	EPA 8081
SEMI-VOLATILE ORGANICS				
1,2,4-Trichlorobenzene	<9.73	mg/Kg	9.73	EPA 8270B
1,2-Dichlorobenzene	<29.5	mg/Kg	29.5	EPA 8270B
1,3-Dichlorobenzene	<29.5	mg/Kg	29.5	EPA 8270B
1,4-Dichlorobenzene	<29.5	mg/Kg	29.5	EPA 8270B
2,4,5-Trichlorophenol	<9.73	mg/Kg	9.73	EPA 8270B
2,4,6-Trichlorophenol	<9.73	mg/Kg	9.73	EPA 8270B
2,4-Dichlorophenol	<9.73	mg/Kg	9.73	EPA 8270B
2,4-Dimethylphenol	<29.5	mg/Kg	29.5	EPA 8270B
2,4-Dinitrophenol	<58.9	mg/Kg	58.9	EPA 8270B
2,4-Dinitrotoluene	<14.7	mg/Kg	14.7	EPA 8270B
2,6-Dinitrotoluene	<14.7	mg/Kg	14.7	EPA 8270B
2-Chloronaphthalene	<9.73	mg/Kg	9.73	EPA 8270B
2-Chlorophenol	<9.73	mg/Kg	9.73	EPA 8270B
2-Methylnaphthalene	<9.73	mg/Kg	9.73	EPA 8270B
2-Methylphenol	<9.73	mg/Kg	9.73	EPA 8270B

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Page: 4
Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639
Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017
Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method
2-Nitroaniline	<9.73	mg/Kg	9.73	EPA 8270B
2-Nitrophenol	<9.73	mg/Kg	9.73	EPA 8270B
3,3'-Dichlorobenzidine	<29.5	mg/Kg	29.5	EPA 8270B
3-,4-Methylphenol	<9.73	mg/Kg	9.73	EPA 8270B
3-Nitroaniline	<29.5	mg/Kg	29.5	EPA 8270B
4,6-Dinitro-2-methylphenol	<29.5	mg/Kg	29.5	EPA 8270B
4-Bromophenylphenyl ether	<9.73	mg/Kg	9.73	EPA 8270B
4-Chloro-3-methylphenol	<9.73	mg/Kg	9.73	EPA 8270B
4-Chloroaniline	<58.9	mg/Kg	58.9	EPA 8270B
4-Chlorophenylphenyl ether	<9.73	mg/Kg	9.73	EPA 8270B
4-Nitroaniline	<9.73	mg/Kg	9.73	EPA 8270B
4-Nitrophenol	<29.5	mg/Kg	29.5	EPA 8270B
Acenaphthene	<9.73	mg/Kg	9.73	EPA 8270B
Acenaphthylene	<9.73	mg/Kg	9.73	EPA 8270B
Anthracene	<9.73	mg/Kg	9.73	EPA 8270B
Benzo(a)anthracene	<9.73	mg/Kg	9.73	EPA 8270B
Benzo(a)pyrene	<9.73	mg/Kg	9.73	EPA 8270B
Benzo(b)fluoranthene	<9.73	mg/Kg	9.73	EPA 8270B
Benzo(g,h,i)perylene	<9.73	mg/Kg	9.73	EPA 8270B
Benzo(k)fluoranthene	<9.73	mg/Kg	9.73	EPA 8270B
Benzoic acid	<29.5	mg/Kg	29.5	EPA 8270B
Benzyl alcohol	<9.73	mg/Kg	9.73	EPA 8270B
Benzyl butyl phthalate	<9.73	mg/Kg	9.73	EPA 8270B
Bis(2-chloroethoxy) methane	<9.73	mg/Kg	9.73	EPA 8270B
Bis(2-chloroethyl) ether	<9.73	mg/Kg	9.73	EPA 8270B
Bis(2-chloroisopropyl) ether	<9.73	mg/Kg	9.73	EPA 8270B
Bis(2-ethylhexyl) phthalate	<58.9	mg/Kg	58.9	EPA 8270B
Chrysene	<9.73	mg/Kg	9.73	EPA 8270B
Di-n-butyl phthalate	<29.5	mg/Kg	29.5	EPA 8270B

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639

Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017

Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method
Di-n-octyl phthalate	<9.73	mg/Kg	9.73	EPA 8270B
Dibenzo(a,h)anthracene	<9.73	mg/Kg	9.73	EPA 8270B
Dibenzofuran	<9.73	mg/Kg	9.73	EPA 8270B
Diethyl phthalate	<9.73	mg/Kg	9.73	EPA 8270B
Dimethyl phthalate	<9.73	mg/Kg	9.73	EPA 8270B
Fluoranthene	<9.73	mg/Kg	9.73	EPA 8270B
Fluorene	<9.73	mg/Kg	9.73	EPA 8270B
Hexachlorobenzene	<9.73	mg/Kg	9.73	EPA 8270B
Hexachlorobutadiene	<29.5	mg/Kg	29.5	EPA 8270B
Hexachlorocyclopentadiene	<29.5	mg/Kg	29.5	EPA 8270B
Hexachloroethane	<29.5	mg/Kg	29.5	EPA 8270B
Indeno(1,2,3-cd)pyrene	<9.73	mg/Kg	9.73	EPA 8270B
Isophorone	<9.73	mg/Kg	9.73	EPA 8270B
N-Nitrosodi-n-propylamine	<9.73	mg/Kg	9.73	EPA 8270B
N-Nitrosodiphenylamine	<9.73	mg/Kg	9.73	EPA 8270B
Naphthalene	<9.73	mg/Kg	9.73	EPA 8270B
Nitrobenzene	<9.73	mg/Kg	9.73	EPA 8270B
Pentachlorophenol	<29.5	mg/Kg	29.5	EPA 8270B
Phenanthrene	<9.73	mg/Kg	9.73	EPA 8270B
Phenol	<9.73	mg/Kg	9.73	EPA 8270B
Pyrene	<9.73	mg/Kg	9.73	EPA 8270B
VOLATILE ORGANIC COMPOUNDS				
1,1,1,2-Tetrachloroethane	<295	µg/Kg	295	EPA 8260B
1,1,1-Trichloroethane	<295	µg/Kg	295	EPA 8260B
1,1,2,2-Tetrachloroethane	<295	µg/Kg	295	EPA 8260B
1,1,2-Trichloroethane	<295	µg/Kg	295	EPA 8260B
1,1-Dichloroethane	<295	µg/Kg	295	EPA 8260B
1,1-Dichloroethene	<295	µg/Kg	295	EPA 8260B
1,1-Dichloropropene	<295	µg/Kg	295	EPA 8260B

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639

Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017

Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method
1,2,3-Trichlorobenzene	<295	µg/Kg	295	EPA 8260B
1,2,3-Trichloropropane	<295	µg/Kg	295	EPA 8260B
1,2,4-Trichlorobenzene	<295	µg/Kg	295	EPA 8260B
1,2,4-Trimethylbenzene	<295	µg/Kg	295	EPA 8260B
1,2-Dibromo-3-chloropropane	<1470	µg/Kg	1470	EPA 8260B
1,2-Dibromoethane	<295	µg/Kg	295	EPA 8260B
1,2-Dichlorobenzene	<295	µg/Kg	295	EPA 8260B
1,2-Dichloroethane	<295	µg/Kg	295	EPA 8260B
1,2-Dichloropropane	<295	µg/Kg	295	EPA 8260B
1,3,5-Trimethylbenzene	<295	µg/Kg	295	EPA 8260B
1,3-Dichlorobenzene	<295	µg/Kg	295	EPA 8260B
1,3-Dichloropropane	<295	µg/Kg	295	EPA 8260B
1,4-Dichlorobenzene	<295	µg/Kg	295	EPA 8260B
2,2-Dichloropropane	<295	µg/Kg	295	EPA 8260B
2-Butanone	<2950	µg/Kg	2950	EPA 8260B
2-Chlorotoluene	<295	µg/Kg	295	EPA 8260B
2-Hexanone	<2950	µg/Kg	2950	EPA 8260B
4-Chlorotoluene	<295	µg/Kg	295	EPA 8260B
4-Methyl-2-pentanone (MIBK)	<1470	µg/Kg	1470	EPA 8260B
Acetone	<7370	µg/Kg	7370	EPA 8260B
Benzene	<295	µg/Kg	295	EPA 8260B
Bromobenzene	<295	µg/Kg	295	EPA 8260B
Bromochloromethane	<295	µg/Kg	295	EPA 8260B
Bromodichloromethane	<295	µg/Kg	295	EPA 8260B
Bromoform	<295	µg/Kg	295	EPA 8260B
Bromomethane	<1470	µg/Kg	1470	EPA 8260B
Carbon disulfide	<2950	µg/Kg	2950	EPA 8260B
Carbon tetrachloride	<295	µg/Kg	295	EPA 8260B
Chlorobenzene	619	µg/Kg	295	EPA 8260B

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Page: 7
Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639
Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017
Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method
Chloroethane	<295	µg/Kg	295	EPA 8260B
Chloroform	<295	µg/Kg	295	EPA 8260B
Chloromethane	<1470	µg/Kg	1470	EPA 8260B
cis-1,2-Dichloroethene	<295	µg/Kg	295	EPA 8260B
cis-1,3-Dichloropropene	<295	µg/Kg	295	EPA 8260B
Dibromochloromethane	<295	µg/Kg	295	EPA 8260B
Dibromomethane	<295	µg/Kg	295	EPA 8260B
Dichlorodifluoromethane	<1470	µg/Kg	1470	EPA 8260B
Ethylbenzene	<295	µg/Kg	295	EPA 8260B
Hexachlorobutadiene	<589	µg/Kg	589	EPA 8260B
Isopropylbenzene	<589	µg/Kg	589	EPA 8260B
m,p-Xylene	<589	µg/Kg	589	EPA 8260B
Methyl tert-butyl ether	<295	µg/Kg	295	EPA 8260B
Methylene chloride	<1470	µg/Kg	1470	EPA 8260B
n-Butylbenzene	<1470	µg/Kg	1470	EPA 8260B
n-Propylbenzene	<295	µg/Kg	295	EPA 8260B
Naphthalene	<589	µg/Kg	589	EPA 8260B
o-Xylene	<295	µg/Kg	295	EPA 8260B
p-Isopropyltoluene	<589	µg/Kg	589	EPA 8260B
sec-Butylbenzene	<295	µg/Kg	295	EPA 8260B
Styrene	<295	µg/Kg	295	EPA 8260B
tert-Butylbenzene	<295	µg/Kg	295	EPA 8260B
Tetrachloroethene	<295	µg/Kg	295	EPA 8260B
Toluene	<295	µg/Kg	295	EPA 8260B
trans-1,2-Dichloroethene	<295	µg/Kg	295	EPA 8260B
trans-1,3-Dichloropropene	<295	µg/Kg	295	EPA 8260B
Trichloroethene	<295	µg/Kg	295	EPA 8260B
Trichlorofluoromethane	<295	µg/Kg	295	EPA 8260B
Vinyl chloride	<295	µg/Kg	295	EPA 8260B

City of Portland
Water Pollution Control Laboratory
Laboratory Analysis Report

Sample Date/Time 9/30/2003 11:24 **System ID** AH08130 **Sample ID** **FO030981**

Page: 1

Proj./Company Name: OF 22B SED SAMP
Address/Location: MH UPSTREAM OF OUTFALL AAJ639

Date Received: 9/30/2003
Sample Status: COMPLETE AND VALIDATED

Proj Subcategory: COLLECTION SYSTEM O&M
Sample Point Code: 1
IMS File/Invoice #: 5030.017

Sample Type: GRAB
Sample Matrix: SEDIMENT
Collected By: MJH/DAC

Comments: LAB: DUE TO THE HIGH CONCENTRATION OF HEAVY HYDROCARBONS IN THE SAMPLE MATRIX, REPORTING LIMITS ARE RAISED FOR MOST ANALYTES. DUE TO THIS MATRIX INTERFERENCE, SOME SURROGATE RECOVERIES WERE LOW AND MATRIX SPIKE DATA IS NOT AVAILABLE FOR THE PESTICIDE/PCB ANALYSIS.

Test Parameter	Result	Units	MRL	Method

End of Report for Sample ID: FO030981

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656

Report Date: 10/8/2003

Validated By: Signature on File

ATTACHMENT B

Laboratory Statement of Work for the Portland Harbor In-Line Solids

Laboratory Statement of Work for the Portland Harbor In-Line Solids

TO: Robert Wong/CVO
Kathy McKinley/CVO

FROM: Scott Echols/CVO

COPIES: Ken Trotman/PDX
David Lacey/PDX
Tina Rice/PDX

DATE: May 19th, 2004

Summary

Project Personnel, Contact Information

The project personnel and their contact information are shown below in Table 1.

TABLE 1.
Project Contact Information
City of Portland In-line Solids Investigation

Name	Responsibility	Phone	e-mail
Ken Trotman/PDX	Project Manager	#643 x4728	Ktrotman@ch2m.com
Dave Lacey/PDX	Task Leader	#643 x4228	Dlacey@ch2m.com
Tina Rice/PDX	Database Lead	#643 x4513	Trice@ch2m.com
Robert Wong/CVO	Laboratory Project Manager	#624 x3130	Robert.wong@ch2m.com
Scott Echols/CVO	Project Chemist	#624 x3148	Sechols@ch2m.com

Communication Procedures

All field sampling issues (e.g. field schedule information, sampling dates, sample and/or bottle shipment questions) contact:
Dave Lacey/PDX

All lab-related issues (e.g. missed holding times, sample dilution questions) contact:
Scott Echols/CVO

All Data Delivery issues (e.g. EDD or hardcopy questions) contact:
Tina Rice/CH2M HILL

Field Work Schedule

One (1) composite sample was collected the week of May 10th and received by the laboratory.

Sample Containers and Number of Sample

Table 2 provides a summary of parameters, containers, preservatives, holding times, and number of samples. No sampling blanks were collected at the request of the project.

Analytical Methods, Target Parameters, and Required Reporting Limits

The target compound list was specified in the attached memo (Basin 22B Inline Solids Analyte List, May 10, 2004) and e-mails (see Appendix A). Table 3 lists the analytical parameters, associated methods, and reporting limits for sediment samples. The reporting limit should correspond to the lowest calibration standard in use for the method.

Percent Moisture/Total Solids (ASTM D2216)

Percent moisture will be determined by placing a known aliquot of a well-mixed sample in a weighed aluminum pan or ceramic crucible and the water evaporated in an oven at 103 °C to 105 °C. The difference in weight of sample before drying and after drying represents the total solids.

The percent solids are calculated as:

- Percent solids = 100* (total solids remaining)/(wet sample weight)

When expressed in terms of the water lost on drying this value the percent moisture is calculated as:

- Percent moisture = 100* (total water lost)/(wet sample weight)

Total Organic Carbon (combustion)

Total organic carbon (TOC) will be determined using guidance from the Inland Testing manual (ITM, EPA 823-B-98-004, *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual*).

The solid sample will be combusted after addition of HCl to remove carbonates. The resulting CO_2 will be measured by infrared spectroscopy and related to the organic carbon concentration in the sample.

Metals (SW3051/6010B)

Metals will be digested following method SW3051 and the digestate analyzed following method SW6010 (ICP-AES). If the reporting limits cannot be met the project chemist must be consulted and use of GFAAS may be required.

Mercury (SW7471A)

Mercury will be analyzed following method SW7471A. Mercury is reduced to its elemental state and its concentration measured using cold-vapor atomic absorption (CVAA).

Total Petroleum Hydrocarbons (TPH) - Diesel Range and Oil Range Organics

The samples will be analyzed for diesel range and oil range TPH following the NWTPH-Dx method. The laboratory may need to use the silica gel cleanup option to remove expected biogenic interferences from the extract before analysis. The project chemist must be consulted if the laboratory does not plan to use the silica gel cleanup.

Organochlorine Pesticides (SW3350B or SW3540C/SW8081A)

Samples will be extracted using the sonication (SW3550B) or Soxhlet (SW3540C) extraction methods (SW3540C). Based on previous experience gel permeation chromatography (GPC) is required for these samples to achieve the required reporting limits. Dual-column confirmation is required, and the QA/QC limits must be met on both columns used for analysis.

The project team also requests that additional cleanup in the form of Carboprep™ be used before GPC. The use of Florisil™, alumina, or silica gel may also be needed to meet project reporting limits.

Polynuclear Aromatic Hydrocarbons (PAHs)

Samples will be extracted using the sonication (SW3550B) or Soxhlet (SW3540C) extraction methods (SW3540C). The use of GPC cleanup and/or silica gel may be necessary on each sample to remove biogenic macromolecules from the sediment samples. Cleanup is required if the samples cannot be analyzed at normal dilution due to biogenic or other interferences.

Sample extracts are analyzed to determine the identities and concentrations of target analytes using gas chromatography-mass spectrometry with the MS detector operated in the selected ion-monitoring mode to reduce the reporting limits.

Laboratory Sample Receipt

Electronic sample receipt information must be sent to the Project Chemist, Scott Echols/CVO and the database lead, Tina Rice/PDX within 24 hours of sample receipt by the laboratory. The acknowledgment letter will describe the number of samples received by the laboratory, the identity of the field sample, the corresponding laboratory identification, the analytical test(s) the laboratory will be conducting, any problems noted during sample log-in, and the date which CH2M HILL can expect complete data results and packages.

Deliverable

The project chemist, Scott Echols/CVO, must be notified in writing if any of the QAQC requirements cannot be met or if the reporting limits cannot be met within 24 hours of the lab becoming aware of the problem.

A turnaround time of 21 days is required. The hardcopy and EDD must both be delivered to meet the TAT. The data is not considered to be final and complete until hardcopy and EDD files meeting the project requirements outlined in this document (Tables 5 through 9) are received.

Hard copy (1 copy) and EDD deliverables should be sent from ASL to:

Tina Rice
CH2M HILL
825 NE Multnomah, Suite 1300
Portland, OR 97232-2146

An additional copy of the hard copy deliverable should be sent to the project chemist Scott Echols/CVO.

Sample Reanalysis

Samples that do not meet the QA/QC criteria due to laboratory failure (i.e., spike accuracy or precision, blank contamination, calibrations, etc. outside QC limits) shall be reanalyzed by the laboratory at their cost. In the event that the laboratory has inappropriate sample amount to reanalyze due to the failure to meet QA/QC requirements, the laboratory may be required to pay the costs for re-sampling and analysis. The laboratory may also be required to pay for re-sampling and analysis should the tissue samples be allocated (without prior written project consent) incorrectly and prevent reporting of one of more of the target analytes.

Quality Assurance and Data Review

QAQC Limits

The specific QC audit types, parameters, and control limits are listed below in Table 4. Analytical data must meet the precision and accuracy limits described this table and all QAQC must conform to the requirements in the ASL Quality Assurance Plan.

Quality control samples exceeding the control limits listed in Table 4 must be described in the case narrative and the project chemist **must be notified in writing** as soon as any QAQC failure is noted by the laboratory.

If the laboratory does not expect to be able to meet any of the limits listed Table 4 the project chemist must be notified in writing and any variances accepted by the project chemist before the laboratory begins sample analysis.

Solvent blanks

In addition to the normal method blank requirements the laboratory is required to analyze a solvent blank each day of analysis for PAH-SIM. The results of the solvent blank must be below the MDL before analysis can continue. An additional solvent blank must be run after the final sample. Report both solvent blanks as samples.

Laboratory Data Review

All generated analytical data is to be checked and reviewed at the laboratory by the analyst generating the data and an experienced data reviewer prior to its release to CH2M HILL.

The analyst's review of the data shall include (but not be limited to) the following elements:

- Sample preparation information is correct and complete
- Sample analysis information is correct and complete
- The appropriate analytical procedures were followed
- Analytical results are correct and complete
- QC samples were within established control limits
- Documentation is complete

The peer review shall include (but not be limited to) the following elements:

- Calibration data are scientifically sound and appropriate
- Qualitative and quantitative results are correct
- Documentation is complete
- The data package is complete and ready for document archiving

Reporting Limits

For the purposes of this project MDL and MQL are described as follows:

Method detection limit (MDL) is a statistically determined concentration. It is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero as determined in the same or a similar matrix. Because of the lack of information on analytical precision at this level, sample results greater than the MDL but less than the MQL will be laboratory qualified as "estimated."

Method Quantitation Limit (MQL) is the sample volume or dry weight adjusted concentration of the target analyte that the laboratory has demonstrated the ability to measure within specified limits of precision and accuracy during routine laboratory operating conditions. This value is variable and highly matrix-dependent. This is the minimum concentration that will be reported as "unqualified" by the laboratory. For organics analysis and inorganic ions, this usually corresponds to the lowest calibration standard used. It is also the inflection point in quantitation where the precision and accuracy in the data falls below the projects MQOs.

The target method quantitation limits (TMQL) are shown in Table 4. These TMQLs are the minimum required are a targets for the actual sample matrix.

With respect to reporting limits:

- Report all data down to the sample adjusted method detection limit. Flag all data above the MDL but below the **laboratory specific reporting limit** (i.e. that based on the calibration curve adjusted for sample mass, etc.) flag data as estimated, J. This flag should be applied to both organic and inorganic data.

- The laboratory RL should be at or below the TMQL listed in Table 4. The project chemist must be notified of any compounds for which the TMQL cannot be met.

- If the laboratory RL is not at or below the TMQL then the laboratory sample adjusted MDL should be at or below the TMQL. The project chemist must be notified of any compounds for which the MDL is not below the TMQL.

TABLE 2
Number of Samples, Analyte List, Analytical Method, containers, preservatives, holding times
City of Portland In-line Solids Investigation

Number of samples	Parameter	Method	Container/ Preservation	Holding Time
Sediment Samples				
1	Sb, As, Cd, Cr, Cu, Pb, Zn Hg	SW6010B SW7471A	2 oz. Glass, 4 °C	6 months (metals) 28-days (Hg)
1	PAHs	SW8270C-SIM		7 days[a]/40 days[b]
1	Pesticides	SW8081A		
1	TPH-Dx, Oil	NWTPH-Dx		
1	Total Organic Carbon	PSEP – total combustion	2 oz. Glass, 4 °C, zero-headspace	14 days
1	Total Organic Carbon	SW9060	2 x 40-mL VOC vials, pH < 2, H2SO4, 4 °C	28 days

a = recommended holding time from sampling to extraction
b = recommended holding time from extraction to analysis

TABLE 3
Required Target Method Quantitation Limits (TMQLs) and Methodology
City of Portland In-line Solids Investigation

Analyte	Analytical Method	TMQL[1]	CAS No.
Conventionals			
Percent moisture/Total Solids	ASTM D-2216	0.01%	NA
Total Organic Carbon (TOC)	ASTM E777-81/combustion	500 mg/kg	NA
Metals		**mg/kg dry weight (ppm)**	
Arsenic –As	SW846-6010B ICP-AES	1	7440-66-6
Cadmium – Cd	SW846-6010B ICP-AES	0.6	7440-43-9
Chromium – Cr	SW846-6010B ICP-AES	1	7440-47-3
Copper – Cu	SW846-6010B ICP-AES	1	7440-50-8
Mercury – Hg	SW846-7471A CVAA	0.002	7439-97-6
Lead – Pb	SW846-6010B ICP-AES	1	7439-92-1
Antimony – Sb	SW846-6010B ICP-AES	1	7440-36-0
Zinc – Zn	SW846-6010B ICP-AES	1	7440-66-6

TABLE 3
Required Target Method Quantitation Limits (TMQLs) and Methodology
City of Portland In-line Solids Investigation

Analyte	Analytical Method	TMQL[1]	CAS No.
Petroleum Hydrocarbons		**mg/kg dw (ppm)**	
Diesel Range Organics	NWTPH-Dx	10	NA
Oil Range Organics	NWTPH-Dx	20	NA
Organochlorine Pesticides		**µg/kg dw (ppb)**	
a – BHC	SW846-8081A	1.0	319-84-6
b – BHC	SW846-8081A	0.5	319-85-7
g - BHC (Lindane)	SW846-8081A	0.5	58-89-9
d – BHC	SW846-8081A	1.0	319-86-8
Heptachlor	SW846-8081A	0.5	76-44-8
Aldrin	SW846-8081A	0.5	309-00-2
Heptachlor epoxide	SW846-8081A	1.0	1024-57-3
g – Chlordane (trans-Chlordane)	SW846-8081A	1.0	5103-74-2
a – Chlordane (cis-Chlordane)	SW846-8081A	1.0	5103-71-9
Endosulfan I	SW846-8081A	1.0	959-98-8
4,4'-DDE	SW846-8081A	2.0	72-55-9
Dieldrin	SW846-8081A	0.5	60-57-1
Endrin	SW846-8081A	0.5	72-20-8
Endosulfan II	SW846-8081A	2.0	33213-65-9
4,4'-DDD	SW846-8081A	2.0	72-54-8
Endrin aldehyde	SW846-8081A	2.0	7421-93-4
4,4'-DDT	SW846-8081A	2.0	50-29-3
Endosulfan sulfate	SW846-8081A	2.0	1031-07-8
Endrin ketone	SW846-8081A	2.0	53494-70-5
Methoxychlor	SW846-8081A	5	72-43-5
Toxaphene	SW846-8081A	100	8001-35-2
Oxychlordane	SW846-8081A	1.0	26880-48-8
cis – Nonachlor	SW846-8081A	1.0	5103-73-1
trans –Nonachlor	SW846-8081A	1.0	39765-80-5
PAHs		**µg/Kg dw (ppb)**	
2-Methylnaphthalene	SW846-8270C SIM	10	91-57-6
1-Methylnaphthalene	SW846-8270C SIM	10	90-12-0

TABLE 3
Required Target Method Quantitation Limits (TMQLs) and Methodology
City of Portland In-line Solids Investigation

Analyte	Analytical Method	TMQL[1]	CAS No.
Acenaphthene	SW846-8270C SIM	10	83-32-9
Acenaphthylene	SW846-8270C SIM	10	208-96-8
Anthracene	SW846-8270C SIM	10	120-12-7
Benzo(a)anthracene	SW846-8270C SIM	10	56-55-3
Benzo(a)pyrene	SW846-8270C SIM	10	50-32-8
Benzo(b)fluoranthene	SW846-8270C SIM	10	205-99-2
Benzo(ghi)perylene	SW846-8270C SIM	10	191-24-2
Benzo(k)fluoranthene	SW846-8270C SIM	10	207-08-9
Chrysene	SW846-8270C SIM	10	218-01-9
Dibenzofuran	SW846-8270C SIM	10	132-64-9
Fluoranthene	SW846-8270C SIM	10	206-44-0
Fluorene	SW846-8270C SIM	10	86-73-7
Indeno(1,2,3-cd)pyrene	SW846-8270C SIM	10	193-39-5
Naphthalene	SW846-8270C SIM	10	91-20-3
Phenanthrene	SW846-8270C SIM	10	85-01-8
Pyrene	SW846-8270C SIM	10	129-00-0

1. TMQLs are the expected method quantitation limits for clean samples.
2. BZ = Ballschmitter and Zell (Fresenius Anal. Chem. 302:20-31, 1980) congener identifications

NA = Not applicable

Table 4
Analytical Measurement Quality Objectives for COI Parameters
City of Portland In-line Solids Investigation

Analytical Data Quality Objectives	Measurement	Metals/Hg	TPH - PAHs Pesticides	TOC
SEDIMENT				
Accuracy	Field and Method Blanks	< MQL	< MQL	< MQL
Accuracy	Second Source Calibration Checks	90% - 110%	80% - 120%	90%-110%
Accuracy	Continuing Calibration Checks	ICP-AES 90% - 110% GFAA/CVAA 80%-120%	PCBs/Pesticides/ Herbicides 85%-115% SVOCs/PAHs 80%-120%	90%-110%
Accuracy	Target Compound Blank Spikes (carried through procedure)	75%-125%	50%-150%	80%-120% when applicable to test
Accuracy	Surrogate Spikes	Not applicable	Lab In-house Limits (must be between 20% and 150%)	Not applicable
Accuracy	Target Compound Sample Matrix Spikes	75%-125%	50%-150%	80%-120% when applicable to test
Precision	Laboratory Duplicates	± 20%	± 20%	± 20%
Precision	Field Duplicates	± 35%	± 35%	± 35%

TABLE 5
E-Data and Hard Copy Report Submittal Instructions
City of Portland In-line Solids Investigation

E-DATA:	
1..	**Format: Access '97**
2..	**Table Structure: use the field names and formats as specified in the "fields" worksheet of this file**
	Name the Access file and table after the lab assigned batch number.
	Note: each batch should have its own database
3..	**E-Mail database or worksheet as a file attachment to Tina Rica at CH2MHill:**
	trice@ch2m.com
	Subject line of message should include e-data reference, project and batch info
	ex: (subject:) e-data, Portland Harbor, P000001
HARD COPY:	

4..	**Mail one original hard copy batch report and invoice to Tina Rice**
	at the following address:
	Tina Rice, CH2M HILL, 825 NE Multnomah, Suite 1300, Portland, OR 97232-2146
5..	**Include invoice with hard copy batch if possible, but don't hold up batch**
6..	**Call Tina Rice as needed: 235-5022 x 4513 or contact via E-mail to trice@ch2m.com**

TABLE 6
E-Data Valid Values: Field Names, Field Types and Lengths
City of Portland In-line Solids Investigation

Field Name	Description	Field Type	Field Length
sample_id	The unique Sample identifier listed on the Chain of Custody	Text	20
batch	The laboratory assigned sample delivery group or batch number	Text	8
lab_sample_id	The laboratory assigned sample ID Number for each sample	Text	15
analysis_class	The analytical class ie. VOC, M-TOTAL, BNA - Consult with CH2M Hill for these assignments	Text	10
analyte_sequence	The sequence analytes are listed on hard copy, reset for each new analysis or sample_id	Number (Integer)	2
cas_no	The Chemical Abstract Service Number, CH2M Hill codes when CAS Number is not avaliable	Text	15
analyte	The common chemical/analyte name	Text	35
result	The numerical result for every analyte, the reporting limit for non detects	Number (Single)	8
qualifier	The flag defining the result, I.e., "U" for non-detect	Text	5
lab_qualifier	The flag assigned by the lab to further qualify sample results (NCA only)	Text	25
units	The method reporting units listed as mg/kg, ug/l etc.	Text	8
detection_limit	The method reporting limit for every analyte	Number (Single)	4
method_detection_limit	The detection limit for every analyte	Number (Single)	4
analytical_method	The analytical method number (ie. SW8010)	Text	10
matrix	The media being analyzed, ie. SOIL, WATER, OIL	Text	10
date_received	The date the lab received the sample	Date/Time	8
date_sampled	The date the sample was taken	Date/Time	8
date_analyzed	The date the sample was analyzed (method specific)	Date/Time	8
date_extracted	The date the sample was extracted in the lab	Date/Time	8
dilution	When applicable	Text	7
percent_moisture	When applicable	Text	5
lab_name	acronym for lab i.e.: OAL, QAL, ARI, CVO	Text	8

TABLE 7
E-Data Valid Values: Compound Names, Analysis Class and Analytical Methods
City of Portland In-line Solids Investigation

Compound Name	Analysis_class	Analytical_Method
Diesel and Oil	TPH	NWTPH-Dx
Polynuclear Aromatic Hydrocarbons-SIM	PAH	SW8270C-SIM
Total Organic Carbon	GENCHEM	ASTM E777

Grain Size	PHYSICAL	ASTMD422
Metals (Ag, Al, As, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Zn)	INORGANIC	SW6020
Semivolatile Organic Compounds	SVOC	SW8270C
PCBs	PCB	SW8082
Pesticides	PESTICIDES	SW8081A
Chlorinated Herbicides	HERBICIDES	SW8151A
Mercury	INORGANIC	SW7470A

TABLE 8
E-Data Valid Values: Analyte ID and CH2M HILL CAS Nos.
City of Portland In-line Solids Investigation

Lab_analyte	CH2M HILL CAS No.
Total Organic Carbon	TOC
NW TPH Diesel	DIESEL_NW
NW TPH Lube Oil	LUBEOIL_NW
Metals, Hg	Use the CAS Number
PAHs	Use the CAS Number
SVOCs	Use the CAS Number
PCBs as Aroclors	Use the CAS Number
Pesticides	Use the CAS Number
Herbicides	Use the CAS Number

TABLE 9
CH2M HILL Applied Sciences Laboratory (ASL) Data Package Deliverables
City of Portland In-line Solids Investigation

All Analytical Fractions
Case Narrative
Sample ID Cross Reference Sheet (Lab IDs and Client IDs)
Completed COC and any sample receipt information
Any analytical/procedural changes (copies of "Confirmation of Communication)
GC/MS Organic Analyses
Form 1 - Sample Results – Include method blank, MS/MSD, LCS/LCSD
Form 2 - Surrogate Recovery Summary
Form 3 – LCS/LCSD and MS/MSD Accuracy and Precision Summary –
Note – report both LCS and LCSD and all MS/MSD on client samples whether specified on COC or not
Form 4 - Method Blank Summary
Form 5 - Instrument Tuning Summary
Form 6 - Initial Calibration Summary
Form 7 - Continuing Calibration Summary
Form 8 - Internal Standard Summary
MDL Study
Pesticide Analyses
Form 1 - Sample Results – Include method blank, MS/MSD, LCS/LCSD
Form 3 – LCS/LCSD and MS/MSD Accuracy and Precision Summary
Note – report both LCS and LCSD and all MS/MSD on client samples whether specified on COC or not
Form 4 - Method Blank Summary
Form 6 - Initial Calibration Summary
Form 7A - Continuing Calibration Summary
Form 7B – DDT/Endrin Degradation Check Summary
Form 8 – Analytical Sequence
Form 10 – Pesticide Identification Summary
MDL Study
Metals
Form 1 - Sample Results - Include method blank, MS/MSD, LCS/LCSD
Form 2A - Initial and Continuing Calibration Summary
Form 3 - Initial and Continuing Calibration Blanks and Method Blanks Summary
Form 4 - Interference Check Standard Summary
Form 5A - Pre-digestion LCS and MS/MSD Recoveries Summary
Form 6 - Native Duplicate or MS/MSD Precision Summary
Note – report both LCS and LCSD and all MS/MSD on client samples whether specified on COC or not
Form 7 - Laboratory Control Sample Recovery Summary
Form 8 - Method of Standard Addition (if necessary)

TABLE 9
CH2M HILL Applied Sciences Laboratory (ASL) Data Package Deliverables
City of Portland In-line Solids Investigation

Form 9 - Serial Dilution (include post spike if applicable)
Form 10 - Instrument or Method Detection Limit Summary
Form 11 – Interelement Correction Factors
Form 12 - Linear Range Summary
Form 13 - Preparation Log Summary
Form 14 – Analysis Run Log
MDL Study
General Chemistry
Includes potentiometric, gravimetric, colorimetric, and titrimetric analytical techniques. Examples, TPH (418.1), TOC, etc. The following forms must be include (where applicable)
Form 1 - Sample Results- Include method blank, MS/MSD, LCS/LCSD
Form 2A - Initial and Continuing Calibration Summary
Form 3 - Initial and Continuing Calibration Blanks and Method Blanks Summary
Form 5A - Matrix Spike and Duplicate (MS/MSD) Recoveries Summary
Note – report both LCS and LCSD and all MS/MSD on client samples whether specified on COC or not
Form 6 - Native Duplicate and MS/MSD Precision Summary
Form 7 - Laboratory Control Sample Recovery Summary
Form 10 - Instrument or Method Detection Limit Summary
Form 13 - Preparation Log Summary

Appendix A

Analyte List Memos

From: Wong, Robert/CVO
Sent: Thursday, May 13, 2004 2:48 PM
To: Echols, Scott/CVO
Subject: FW: OF 22B analyte list memo
-----Original Message-----
From: Lacey, David/PDX
Sent: Thursday, May 13, 2004 1:57 PM
To: Wong, Robert/CVO
Subject: FW: OF 22B analyte list memo

-----Original Message-----
From: Pratt, Randy/CVO
Sent: Monday, May 10, 2004 9:42 PM
To: Sanders, Dawn
Cc: Trotman, Ken/PDX; Lacey, David/PDX
Subject: OF 22B analyte list memo

attached is the final 22B analyte list memo based on our discussions today. Significant changes from previous versions include the deletion of selenium, silver, SVOC (phthalates, phenols, ect.) chlorinated herbicides, and PCBs. The comments section of the analyte table has been revised to detail some of the rational for selecting the analytes. We can discuss further tomorrow if you have additional thoughts about this memo. Dave Lacey is planning on collecting the sample at 22B sometime between Wednesday and Friday of this week. See you tomorrow. Randy

TECHNICAL MEMORANDUM CH2MHILL

Basin 22B Inline Solids Analyte List

PREPARED FOR: Project File

PREPARED BY: David Lacey/CH2M HILL
Ken Trotman/CH2M HILL
Randy Pratt/CH2M HILL

COPIES:

DATE: May 10, 2004

Introduction

The City is planning to cleanout a section of stormwater line in Basin 22B in which solids have accumulated. Cleanout is anticipated to be finished the week of May 3, 2004. A composite solids sample of the material removed from the storm line will be collected and analyzed. This technical memorandum identifies the analyses that will be performed on the composite sample and the selection rationale for these analytes. A duplicate sample will be collected and archived (frozen) for possible future analysis (freezing extends the holding time to one year).

Sampling and Analysis Objectives

The objectives of the sampling are:

1. Collect data that supports identification of sites with potential for contributing to current contamination and future recontamination of river sediments.
2. Collect data that supports the fair allocation of CERCLA remedial action costs associated with the storm water collection system.

Analysis

Based on the objectives specified above, the following analyte list has been developed.

Analyte	Method	Additional Sample Cleanup	Comments
antimony	SW6010	No	**Rational**: COI at Gould. **Other Comments**: Concentration the highest in sediment sample nearest the outfall. However, below DEQ High in sediment samples (but at highest concentration of all five priority 1 basins (M-3, 22B, 22C, 19, and 19A)).

arsenic	SW6010B – ICP-AES	No	**Rational**: Exceeds DEQ High in sediment sample nearest the outfall; COI at Gould , and Schnitzer.
cadmium	SW6010B – ICP-AES	No	**Rational**: Detected in the waste characterization sample above DEQ High; COI at Gould. **Other Comments**: concentration just above DEQ Low in sediment sample nearest outfall.
chromium	SW6010B – ICP-AES	No	**Rational**: above DEQ High in sediment sample near the outfall ; just below DEQ High in waste profile sample **Other Comments:** ; not a known contaminant at ECSI sites in basin
copper	SW6010B – ICP-AES	No	**Rational**: above DEQ High in sediment sample near the outfall **Other Comments:** not tested in waste profile sample; not a known contaminant at ECSI sites in basin
lead	SW6010B – ICP-AES	No	**Rational**: above DEQ High in sediment sample near the outfall; COI at Gould, Schnitzer; above DEQ High in waste profile sample
mercury	SW7471A - CVAA	No	**Rational:** detected above DEQ High in waste profile sample; concentration above DEQ Baseline in sediment sample near the outfall **Other Comments:** not a known contaminant at ECSI sites in basin
zinc	SW6010B – ICP-AES	No	**Rational**: above DEQ High in 2 sediment samples nearest the outfall; COI at Gould **Other Comments**: not tested in waste profile sample
PAHs	SW8270C SIM	Yes – silica gel, possible GPC	**Rational**: above DEQ High for 2 PAHs and for sum of HPAHs in the sediment sample near the outfall; high motor oil TPH in waste profile sample. **Other Comments**: PAHs not detected in waste profile sample (MDLs were very high).
Organo-chlorine pesticides	SW8081A	Yes – Carboprep column followed by GPC	**Rational:** DDT compounds found in all sediment samples above DEQ High. Not found in waste profile sample but MDL above levels of concern. Test for pesticides to clarify that source of DDT in sediment is from upstream of outfall. **Other Comments**: DDT is COI for Atofina, a site upstream of OF 22B.
TPH-Dx	NWTPH-Dx	No	**Rational**: detected in waste profile sample; this is a test that can provide insight into the general character of the sample **Other Comments:** Not a listed DEQ contaminant of concern; concentrations in sediment samples not particularly high.
TOC	ASTM E777-81	No	Assists in assessing physical characteristics of sample matrix.

This list was derived based on results from the following sources:

1) *Programmatic Source Control Remedial Investigation Work Plan for the City of Portland Outfalls Project* (Programmatic Work Plan) (CH2M HILL 2004).

2) Appendix B of the Programmatic Work Plan *(Source Control Sediment Investigation for the City of Portland Outfalls*)

3) Previous sample collected for waste disposal characterization (Attachment 1)

A summary of each of these sources is presented below.

Programmatic Work Plan

Table 4-2 Outfall Prioritization from the Programmatic Work Plan presents the results of the outfall prioritization process. Table 1-1 presents information regarding PCOIs identified in Basin 22B.

Table 1

PCOI Information for Basin 22B
(Information originally presented in Table 4-1 of the Programmatic Work Plan)

Chemicals with Considerably Elevated Concentrations	Chemicals with Slightly Elevated Concentrations	Potential Sources in the Outfall Basin with PCOIs that Match the PCOIs that Exceed Comparison Levels[3]	Potential Sources Upstream or Near the Outfall with PCOIs that Match the PCOIs that Exceed Comparison Levels	Justification for Listed Priority
DDT, arsenic, chromium, mercury, lead, and zinc.	Copper.	Gould Inc./NL Industries Inc. (ECSI #49)–Arsenic, lead, and zinc. Metro Central Transfer Station (ECSI #1398)–Heavy metals and pesticides. Doane Lake Study Area (ECSI #36)–Lead and arsenic. Schnitzer Investment–Doane Lake (ECSI #395)–arsenic and lead.	ATOFINA Chemicals (ECSI #398)–DDT. ESCO Corp.–Willbridge Landfill (ECSI #397)–Lead, foundry sand, slag, demolition debris, dust, and foundry yard debris. Rhone Poulenc–East Doane Lake (ECSI #155)–lead, arsenic, and pesticides. The Rhone Poulenc site discharges to private outfall WP-06 directly adjacent to Outfall 22B.	Considerably elevated concentrations of DDT, arsenic, chromium, lead, and zinc were detected in the in-river sediments near 22B. There is no attributable upriver or nearby source for chromium or zinc.

Appendix B of the Programmatic Work Plan

BES collected four shallow sediment samples in the vicinity of Outfall 22B in 2002. The following analytes exceeded either the DEQ High or Portland Harbor Baseline sediment screening values: PAHs (acenaphthylene, benzo[g,h,i]perylene, indeno(1,2,3-cd)pyrene, LPAHs, and HPAHs), Chlorinated Herbicides (2,4-Db), Metals (antimony, chromium, copper, lead, mercury, nickel, silver, and zinc), and Pesticides (4,4'-DDD, 4,4'-DDE, and Total DDTs).

Waste Disposal Characterization Samples

An inline solids sample was collected for waste disposal characterization on September 30, 2003. The following analytes exceeded either the DEQ High or Portland Harbor Baseline sediment screening values: Metals (arsenic, cadmium, chromium, lead, mercury, selenium, and silver). Matrix interference and elevated levels of motor oil range hydrocarbons results in method reporting levels significantly higher then sediment screening levels for herbicides, SVOCs, pesticides/PCBs.

Sample Archiving

CH2M HILL Applied Sciences Laboratory (ASL) provides sample archiving services. Samples are kept frozen in the laboratory walk-in locker in clearly labeled boxes with the project name, date, and contact person information (usually the project manager). The label also indicates that this person must be contacted prior to disposal of any samples. The small monthly charge on the invoice for sample storage services reminds all parties that the samples still reside at the laboratory.

Laboratory

Laboratory selection will be reviewed with the client. Laboratory coordination, and sample distribution will be handled by the project chemist and field team leader. Due to the additional sample cleanup method requirements for this sample, ASL is the proposed laboratory. Scott Echols, project chemist, will be able to effectively coordinate with ASL to ensure sample cleanup and analyses are as required.

References

CH2M HILL. March 19, 2004. Programmatic Source Control Remedial Investigation Work Plan for the City of Portland Outfalls Project. Prepared for the Bureau of Environmental Services, City of Portland, Portland, Oregon.

CH2M HILL. July 2003. Source Control Sediment Investigation for the City of Portland Outfalls. Prepared for the Bureau of Environmental Services, City of Portland, Portland, Oregon.

From: Sanders, Dawn [DAWNS@BES.CI.PORTLAND.OR.US]

Sent: Tuesday, May 18, 2004 11:07 AM

To: Trotman, Ken/PDX; Sanders, Dawn; Pratt, Randy/CVO

Cc: Echols, Scott/CVO

Subject: RE: Questions: Portland Harbor In-Line Solids

Concur- Don't see them detected or at any appreciable level in sediment.

> -----Original Message-----

> From: Trotman, Ken/PDX [mailto:Ken.Trotman@CH2M.com]

> Sent: Tuesday, May 18, 2004 10:27 AM

> To: DAWNS@BES.CI.PORTLAND.OR.US; Randy.Pratt@CH2M.com

> Cc: Scott.Echols@CH2M.com

> Subject: FW: Questions: Portland Harbor In-Line Solids

>

> Dawn, we dropped SW8270 which would include compounds discussed in

> Items 1 and 3 below. Don't see a reason to analyze for them using

> another method. Do you concur? They don't seem to be a risk driver

> based on info from Dillon and Shelton. What do you think? Kt.

>

> -----Original Message-----

> From: Echols, Scott/CVO

> Sent: Monday, May 17, 2004 1:51 PM

> To: Lacey, David/PDX; Trotman, Ken/PDX; Pratt, Randy/CVO

> Subject: RE: Questions: Portland Harbor In-Line Solids

>

> All,

>

> See my comments (in blue) below regarding some questions the lab has

> about the samples wanting confirmation that the analytesare somewhat

> different than on a "normal" list. Just wanted to confirm with you

> guys that they are needed so the effort is warranted. Questions 1 and

> 3 would not normally be an issue if all analyses were being run on the

> samples since the data would be captured by the other methods

> indicated.

>

> Dave I will call you about the sample receipt temperature.

>

> Thanks,

> Scott

>

> -----Original Message-----

> From: Wong, Robert/CVO

> Sent: Thursday, May 13, 2004 3:45 PM

> To: Echols, Scott/CVO

> Subject: Questions: Portland Harbor In-Line Solids

>

> So here's a summary of my questions for the Portland Harbor project,

> and one more we didn't talke about.

>

> 1. Does Carbazole need to be on the PAH-SIM list? We have an MDL

> for carbazole for the SW8270 SVOC (SCAN) list, but not no MDL for SIM.

>

> The inclusion of carbazole as a PAH-SIM compound was a direct result

> of using the LWG QAPP as the template for the orginal outfall work.

> Carbazole is similar in structure to PAHs (i.e. three rings) but

> includes a nitrogen in the structure and is technically an amine. It
> is normally only on the SVOC list of compounds.
>
> Does the project need Carbazole for this sample included with the
> PAHs ? If so, I will instruct the lab to analyze it as a PAH-SIM.
>
> 2. I still need to write an e-mail to you regarding the Metals RLs.
> In short, they're really low and RL for Zinc is impossibly low. Based
> on our conversation though, we'll plan on running the metals by ICP.
> If there are any non-detects, we'll come talk to you about
> it.....may need to run by GFAA.
>
> My feeling is that detectablility with the metals will not be a
> problem and I have instructed the lab to run samples first by ICP-AES
> and then talk to me if there are any non detect results for metals.
>
> 3. Hexachlorobenzene, hexachlorobutadiene, and hexachloroethane
> appears on the pesticide list in the QAPP. These are normally SW8270
> compounds. Wanted to comfirm that these compounds need to stay on the
> pesticide list. We currently don't have MDLs for these compounds,
> along with oxychlordane, cis-nonachlor, or trans-nonachlor.
>
> Again I believe the original inclusion of hexachlorobenzene,
> hexachlorobutadiene, and hexachloroethane in the pesticides list came
> from either the LWG QAPP or teminology used in the outfall data
> summary from previous work. Hexachlorobutadiene and hexachloroethane
> are usually only on the SVOC list, while hexachlorobenzene does appear
> on the SW8081A list.

>

> Does the project need these chlorinated compounds included with the

> chlorinated pesticides ? If so, I will instruct the lab to analyze

> them.

>

>

> Robert Wong

> CH2M HILL Applied Sciences Lab

> (541) 768-3130

> rwong@ch2m.com

>

>

ATTACHMENT C

CH2M HILL Field Notes for May 14, 2004, Sample

5-14-04

BBS Source Control - 22B Cleanout Composit Sample

930 On Site: DeLACEY
Weather: Cloudy, 60°F, light West Breeze
Objective: Collect composite SAMPLE from material removed from 22B cleanout
Method: SAME AS 3-1-04

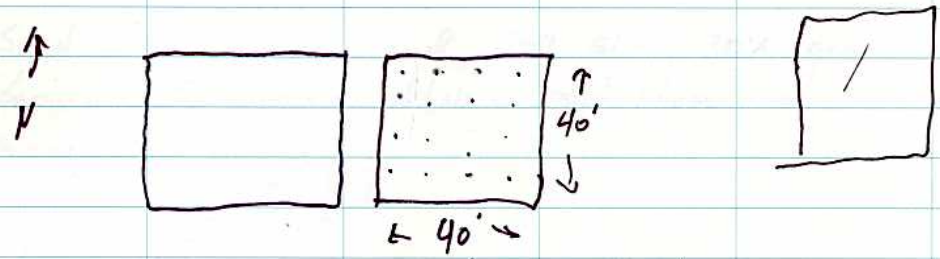
Decon: Soil Auger and composite bowl with Alcox and DI water

1000 Collect Sample IL22B-CM05140404-0

Sample collected from 40' x 40' pad at the center of the INCINERATOR site. Soilds were 1 to two-feet deep across the pad with a three foot mound in the southwest corner. Solids were SILT WITH SAND, black, 50% sand. large amount of debris including - latex gloves, plastic bottles, styrofoam packaging foam, cigarette butts, plastic bags, tennis ball. All visable debris removed from sample. Bit 1% organic matter: twigs, leafs. Sheen observed on sample and on surface water of the pad

A 16 point composite SAMPLE was collected. Each point was collected through the entire column depth. Sample was composited in a decontaminate stainless steal mixing bowl. Sample discribed below:

SILT WITH SAND, Black, Wet, Moderate Sheen observed during mixing, 50% Silt, 50% Sand, 1% organic matter.



Composite Sample Location

1130 OFF Site.

ATTACHMENT D

Laboratory Data Sheets for May 14, 2004, Sample

CH2M HILL
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL
Applied Sciences Group

June 17, 2004

Portland—BES Source Control

182032.SL.BA.2B.01

RE: Laboratory Report for Portland—BES Source Control
Applied Sciences Group Reference No. D3392

Dave Lacey/PDX:

On May 17, 2004, CH2M HILL Applied Sciences Group received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. This data package meets standards requested by client and is not intended or implied to meet any other standard.

CH2M HILL Applied Sciences Group appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Robert Wong at (541) 758-0235, extension 3130.

Sincerely,

Robert Wong
Analytical Manager

Enclosures

cc:
Scott Echols/CVO

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Sciences Group Reference No. D3392

Sample ID	Client Sample ID	Date Collected	Time Collected
D339201	IL22BCM0514040	05/14/2004	10:00

Table of Contents
CH2M HILL Laboratory Reference No. D3392

Page

Applied Sciences Laboratory

Organic CLP and CLP Like Data Qualifiers

U The analyte was analyzed for, but not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".

NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

P The primary and confirmation analyte result recoveries do not match.

E The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Inorganic CLP and CLP Like Data Qualifiers

U The analyte was analyzed for, but not detected above the reported sample quantitation limit.

B The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

E The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

SEMIVOLATILE ORGANICS ANALYSIS BY METHOD SW8270SIM

CASE NARRATIVE
SW8270SIM

Analytical Method: SW8270-SIM Batch No.: D3392

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 182032.SL.BA.2B.01

Base/Command: Portland—BES Source Control Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate Sample(s):
Seventeen out of eighteen compounds were outside the acceptance criteria for RPD and or percent recoveries due to matrix interference.

D. Surrogate Recoveries:
All acceptance criteria were met.

E. Laboratory Control Spike(LCS)
All acceptance criteria were met.

F. Analytical Exception:
All acceptance criteria were met.

G. Other:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: JBHeathman Date: 6/15/04

Reviewed by: [signature] Date: 6/16/04

SAMPLE DATA SUMMARY

1C

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **IL22BCM0514040**

SDG No.: D3392

Analysis Method: SW8270SIM

Matrix: SOIL pH:

Sample wt/vol: (g/mL) 10.2 G

Level: (low/med) LOW

Percent Moisture: 41 Decanted: N

Extraction Method: SW3550 Cleanup - GPC: Y

Concentrated Extract Volume: (mL) 1

Injection Volume: (uL) 1

Instrument: MSC

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: D339201

Lab File ID: 339201.D

Date Received: 05/17/04

Date Extracted: 05/21/04

Date Analyzed: 06/04/04

Dilution Factor: 2

CONCENTRATION UNITS: ug/Kg

CAS NO.	COMPOUND	MDL	PQL	RESULT	Q
91-20-3	Naphthalene	1.73	8.31	42.7	
91-57-6	2-Methylnaphthalene	1.41	8.31	20.9	
90-12-0	1-Methylnaphthalene	2.80	16.6	12.8	J
208-96-8	Acenaphthylene	1.83	8.31	14.6	
83-32-9	Acenaphthene	2.19	8.31	221	
132-64-9	Dibenzofuran	1.83	2.33	47.2	
86-73-7	Fluorene	1.71	8.31	110	
85-01-8	Phenanthrene	1.85	8.31	845	E
120-12-7	Anthracene	2.14	8.31	254	
206-44-0	Fluoranthene	1.90	8.31	1730	E
129-00-0	Pyrene	1.98	8.31	1640	E
56-55-3	Benzo(a)anthracene	1.63	8.31	1280	E
218-01-9	Chrysene	2.12	8.31	1570	E
205-99-2	Benzo(b)fluoroanthene	2.34	8.31	1330	E
207-08-9	Benzo(k)fluoranthene	3.24	8.31	963	E
50-32-8	Benzo(a)pyrene	4.12	8.31	1510	E
193-39-5	Indeno(1,2,3-c,d)pyrene	4.14	8.31	1060	E
191-24-2	Benzo(g,h,i)perylene	4.12	8.31	1020	E

1C

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **IL22BCM0514040DL**

SDG No.: D3392

Analysis Method: SW8270SIM

Matrix: SOIL pH:

Sample wt/vol: (g/mL) 10.2 G

Level: (low/med) LOW

Percent Moisture: 41 Decanted: N

Extraction Method: SW3550 Cleanup - GPC: N

Concentrated Extract Volume: (mL) 1

Injection Volume: (uL) 1

Instrument: MSC

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: D339201DL

Lab File ID: 339201DL.D

Date Received: 05/17/04

Date Extracted: 05/21/04

Date Analyzed: 06/07/04

Dilution Factor: 10

CONCENTRATION UNITS: ug/Kg

CAS NO.	COMPOUND	MDL	PQL	RESULT	Q
91-20-3	Naphthalene	8.66	41.5	44.3	
91-57-6	2-Methylnaphthalene	7.03	41.5	20.4	J
90-12-0	1-Methylnaphthalene	13.9	83.1	14.0	J
208-96-8	Acenaphthylene	9.17	41.5	13.7	J
83-32-9	Acenaphthene	10.9	41.5	244	
132-64-9	Dibenzofuran	9.14	11.6	52.1	
86-73-7	Fluorene	8.59	41.5	112	
85-01-8	Phenanthrene	9.24	41.5	939	
120-12-7	Anthracene	10.7	41.5	324	
206-44-0	Fluoranthene	9.51	41.5	2140	
129-00-0	Pyrene	9.88	41.5	2030	
56-55-3	Benzo(a)anthracene	8.15	41.5	1410	
218-01-9	Chrysene	10.6	41.5	1810	
205-99-2	Benzo(b)fluoroanthene	11.7	41.5	1390	
207-08-9	Benzo(k)fluoranthene	16.2	41.5	1490	
50-32-8	Benzo(a)pyrene	20.5	41.5	1840	
193-39-5	Indeno(1,2,3-c,d)pyrene	20.7	41.5	1120	
191-24-2	Benzo(g,h,i)perylene	20.7	41.5	1180	

1C

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **SB1-0521**

SDG No.: D3392

Analysis Method: SW8270SIM

Matrix: SOIL pH:

Sample wt/vol: (g/mL) 10 G

Level: (low/med) LOW

Percent Moisture: Decanted: N

Extraction Method: SW3550 Cleanup - GPC: N

Concentrated Extract Volume: (mL) 1

Injection Volume: (uL) 1

Instrument: MSC

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0521

Lab File ID: SB1-0521.D

Date Received: / /

Date Extracted: 05/21/04

Date Analyzed: 05/28/04

Dilution Factor: 1

CONCENTRATION UNITS: ug/Kg

CAS NO.	COMPOUND	MDL	PQL	RESULT	Q
91-20-3	Naphthalene	0.521	2.50	2.50	U
91-57-6	2-Methylnaphthalene	0.423	2.50	2.50	U
90-12-0	1-Methylnaphthalene	0.839	5.00	5.00	U
208-96-8	Acenaphthylene	0.552	2.50	2.50	U
83-32-9	Acenaphthene	0.656	2.50	2.50	U
132-64-9	Dibenzofuran	0.550	0.700	0.700	U
86-73-7	Fluorene	0.517	2.50	2.50	U
85-01-8	Phenanthrene	0.556	2.50	2.50	U
120-12-7	Anthracene	0.645	2.50	2.50	U
206-44-0	Fluoranthene	0.572	2.50	2.50	U
129-00-0	Pyrene	0.595	2.50	2.50	U
56-55-3	Benzo(a)anthracene	0.491	2.50	2.50	U
218-01-9	Chrysene	0.638	2.50	2.50	U
205-99-2	Benzo(b)fluoroanthene	0.704	2.50	2.50	U
207-08-9	Benzo(k)fluoranthene	0.973	2.50	2.50	U
50-32-8	Benzo(a)pyrene	1.24	2.50	2.50	U
193-39-5	Indeno(1,2,3-c,d)pyrene	1.24	2.50	2.50	U
191-24-2	Benzo(g,h,i)perylene	1.24	2.50	2.50	U

1C

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **B1-0604**

SDG No.: D3392

Analysis Method: SW8270SIM

Matrix: SOIL pH:

Sample wt/vol: (g/mL) 10 G

Level: (low/med) LOW

Percent Moisture: Decanted: N

Extraction Method: SW3550 Cleanup - GPC: N

Concentrated Extract Volume: (mL) 1

Injection Volume: (uL) 1

Instrument: MSC

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: B1-0604

Lab File ID: B1-0604.D

Date Received: / /

Date Extracted: 05/21/04

Date Analyzed: 06/04/04

Dilution Factor: 1

CONCENTRATION UNITS: ug/Kg

CAS NO.	COMPOUND	MDL	PQL	RESULT	Q
91-20-3	Naphthalene	0.521	2.50	2.50	U
91-57-6	2-Methylnaphthalene	0.423	2.50	2.50	U
90-12-0	1-Methylnaphthalene	0.839	5.00	5.00	U
208-96-8	Acenaphthylene	0.552	2.50	2.50	U
83-32-9	Acenaphthene	0.656	2.50	2.50	U
132-64-9	Dibenzofuran	0.550	0.700	0.700	U
86-73-7	Fluorene	0.517	2.50	2.50	U
85-01-8	Phenanthrene	0.556	2.50	2.50	U
120-12-7	Anthracene	0.645	2.50	2.50	U
206-44-0	Fluoranthene	0.572	2.50	2.50	U
129-00-0	Pyrene	0.595	2.50	2.50	U
56-55-3	Benzo(a)anthracene	0.491	2.50	2.50	U
218-01-9	Chrysene	0.638	2.50	2.50	U
205-99-2	Benzo(b)fluoroanthene	0.704	2.50	2.50	U
207-08-9	Benzo(k)fluoranthene	0.973	2.50	2.50	U
50-32-8	Benzo(a)pyrene	1.24	2.50	2.50	U
193-39-5	Indeno(1,2,3-c,d)pyrene	1.24	2.50	2.50	U
191-24-2	Benzo(g,h,i)perylene	1.24	2.50	2.50	U

1C

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **B2-0604**

SDG No.: D3392

Analysis Method: SW8270SIM

Matrix: SOIL pH:

Sample wt/vol: (g/mL) 10 G

Level: (low/med) LOW

Percent Moisture: Decanted: N

Extraction Method: SW3550 Cleanup - GPC: N

Concentrated Extract Volume: (mL) 1

Injection Volume: (uL) 1

Instrument: MSC

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: B2-0604

Lab File ID: B2-0604.D

Date Received: / /

Date Extracted: 05/21/04

Date Analyzed: 06/04/04

Dilution Factor: 1

CONCENTRATION UNITS: ug/Kg

CAS NO.	COMPOUND	MDL	PQL	RESULT	Q
91-20-3	Naphthalene	0.521	2.50	2.50	U
91-57-6	2-Methylnaphthalene	0.423	2.50	2.50	U
90-12-0	1-Methylnaphthalene	0.839	5.00	5.00	U
208-96-8	Acenaphthylene	0.552	2.50	2.50	U
83-32-9	Acenaphthene	0.656	2.50	2.50	U
132-64-9	Dibenzofuran	0.550	0.700	0.700	U
86-73-7	Fluorene	0.517	2.50	2.50	U
85-01-8	Phenanthrene	0.556	2.50	2.50	U
120-12-7	Anthracene	0.645	2.50	2.50	U
206-44-0	Fluoranthene	0.572	2.50	2.50	U
129-00-0	Pyrene	0.595	2.50	2.50	U
56-55-3	Benzo(a)anthracene	0.491	2.50	2.50	U
218-01-9	Chrysene	0.638	2.50	2.50	U
205-99-2	Benzo(b)fluoroanthene	0.704	2.50	2.50	U
207-08-9	Benzo(k)fluoranthene	0.973	2.50	2.50	U
50-32-8	Benzo(a)pyrene	1.24	2.50	1.27	J
193-39-5	Indeno(1,2,3-c,d)pyrene	1.24	2.50	2.50	U
191-24-2	Benzo(g,h,i)perylene	1.24	2.50	2.50	U

QC SUMMARY

2C

SOIL SEMI-VOLATILE SURROGATE RECOVERY

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

	FIELD/QC SAMPLE ID	S1	S2	S3	S4	S5	S6	S7	S8	TOT OUT
1	SB1-0521	102	117	120	92					
2	BS1S0521	74	112	114	103					
3	BD1S0521	75	117	118	110					
4	IL22BCM0514040	84	109	101	117					
5	IL22BCM0514040DL	89	121	114	115					
6	IL22BCM0514040MS	84	121	116	94					
7	IL22BCM0514040MSD	74	109	101	84					

	QC LIMITS
S1: Methylnaphthalene-d10	(35-125)
S2: Fluoranthene-d10	(35-125)
S3: Terphenyl-d14	(18-137)
S4: Benzo(a)pyrene-d12	(35-125)

* Values outside of contract required QC limits

D Surrogate diluted out

SOIL SEMI-VOLATILE MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

Parent Sample ID: IL22BCM0514040

Matrix Spike ID: IL22BCM0514040MS

Matrix Spike Duplicate ID: IL22BCM0514040MSD

Analyte	Sample Result ug/Kg	MS Spike Added	MS Result ug/Kg	MS %R	MSD Spike Added	MSD Result ug/Kg	MSD %R	%RPD	QC Limits %RPD	QC Limits %R	Q
Naphthalene	42.65	81.7	130	107	81.7	92.7	61	54.	20	50-150	*
2-Methylnaphthalene	20.94	81.7	86.4	80	81.7	65.6	55	37.	20	50-150	*
1-Methylnaphthalene		81.7	137	152	81.7	117	128	17.	20	50-150	*
Acenaphthylene	14.64	81.7	93.9	97	81.7	87.4	89	8.5	20	50-150	
Acenaphthene	221.1	81.7	253	39	81.7	183	-47	-21	20	50-150	*
Fluorene	110.4	81.7	179	84	81.7	128	22	118	20	50-150	*
Phenanthrene	844.7	81.7	903	72	81.7	530	-385	-29	20	50-150	*
Anthracene	253.9	81.7	395	172	81.7	282	35	132	20	50-150	*
Fluoranthene	1730	81.7	1710	-24	81.7	1090	-781	-18	20	50-150	*
Pyrene	1635	81.7	1560	-93	81.7	1080	-677	-15	20	50-150	*
Benzo(a)anthracene	1283	81.7	996	-352	81.7	707	-706	-67	20	50-150	*
Chrysene	1565	81.7	1360	-245	81.7	990	-704	-96	20	50-150	*
Benzo(b)fluoroanthene	1332	81.7	1190	-170	81.7	797	-655	-11	20	50-150	*
Benzo(k)fluoranthene	962.8	81.7	1140	215	81.7	887	-93	504	20	50-150	*
Benzo(a)pyrene	1515	81.7	1370	-178	81.7	981	-653	-11	20	50-150	*
Indeno(1,2,3-c,d)pyrene	1063	81.7	841	-271	81.7	555	-622	-78	20	50-150	*
Benzo(g,h,i)perylene	1018	81.7	907	-135	81.7	600	-511	-11	20	50-150	*
Dibenzofuran	47.21	81.7	130	101	81.7	89.0	51	65.	20	50-150	*

* Values outside of QC limits

Comments:

3D

SOIL SEMI-VOLATILE BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

Blank Spike ID: BS1S0521

Blank Spike Duplicate ID: BD1S0521

Analyte	Spike Added	BS Result ug/Kg	%R	BSD Result ug/Kg	%R	%RPD	QC Limits %RPD	QC Limits %R	Q
Naphthalene	50	34.4	69	35.5	71	3.2	20	50-150	
2-Methylnaphthalene	50	35.6	71	36.1	72	1.2	20	50-150	
1-Methylnaphthalene	50	65.5	131	67.3	135	2.7	20	50-150	
Acenaphthylene	50	48.1	96	49.3	99	2.4	20	50-150	
Acenaphthene	50	44.8	90	46.5	93	3.7	20	50-150	
Fluorene	50	46.1	92	47.8	96	3.5	20	50-150	
Phenanthrene	50	46.3	93	48.3	97	4.2	20	50-150	
Anthracene	50	49.9	100	51.8	104	3.7	20	50-150	
Fluoranthene	50	50.1	100	51.9	104	3.6	20	50-150	
Pyrene	50	50.1	100	52.2	104	4.0	20	50-150	
Benzo(a)anthracene	50	44.9	90	47.4	95	5.5	20	50-150	
Chrysene	50	47.4	95	50.2	100	5.6	20	50-150	
Benzo(b)fluoroanthene	50	49.2	98	51.2	102	3.9	20	50-150	
Benzo(k)fluoranthene	50	46.7	93	49.7	99	6.0	20	50-150	
Benzo(a)pyrene	50	50.6	101	53.7	107	5.8	20	50-150	
Indeno(1,2,3-c,d)pyrene	50	51.5	103	55.0	110	6.4	20	50-150	
Benzo(g,h,i)perylene	50	51.6	103	54.8	110	5.9	20	50-150	
Dibenzofuran	50	44.4	89	46.0	92	3.4	20	50-150	

* Values outside of QC limits

Comments:

4B

SOIL SEMI-VOLATILE METHOD BLANK SUMMARY

Field Sample ID: SB1-0521

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM Lab Sample ID: SB1-0521

Lab File ID: SB1-0521.D Date Extracted: 05/21/04

Matrix: (Soil/Water) SOIL Date Analyzed: 05/28/04

Level: (low/med) LOW Time Analyzed: 1436

Instrument: MSC

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	FIELD SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	BS1S0521	BS1S0521	BS1S0521.D	1505
02	BD1S0521	BD1S0521	BD1S0521.D	1534
03	B1-0604	B1-0604	B1-0604.D	1950
04	IL22BCM0514040	D339201	339201.D	2019
05	B2-0604	B2-0604	B2-0604.D	2048
06	IL22BCM0514040DL	D339201DL	339201DL.D	1709
07	IL22BCM0514040MS	D339201MS	339201MS.D	1656
08	IL22BCM0514040MSD	D339201MSD	339201SD.D	1725

COMMENTS: _____

5B

SEMI-VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK

DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

Lab File ID: T2-0527.D DFTPP Injection Date: 05/27/04

Instrument ID: MSC DFTPP Injection Time: 1729

Mass	Ion Abundance Criteria	% Relative		Q
51	30% to 60% of mass 198	83896	(38.8)	
68	less than 2% of mass 69	0	(0.0)	
69	mass 69 relative abundance	78720	(100.0)	
70	less than 2% of mass 69	191	(0.2)	
127	40% to 60% of mass 198	94925	(43.9)	
197	less than 1% of mass 198	542	(0.3)	
198	base peak, 100% relative abundance	216213	(100.0)	
199	5% to 9% of mass 198	14272	(6.6)	
275	10% to 30% of mass 198	57386	(26.5)	
365	greater than 1% of mass 198	5815	(2.7)	
441	present, but less than mass 443	23621	(73.6)	
442	greater than 40% of mass 198	166248	(76.9)	
443	17% to 23% of mass 442	32104	(19.3)	

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

EPA SAMPLE NO.	LAB SAMPLE NO.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
LEVEL 1	LEVEL 1	LEVEL1A.D	05/27/04	1743
LEVEL 2	LEVEL 2	LEVEL2.D	05/27/04	1812
LEVEL 3	LEVEL 3	LEVEL3.D	05/27/04	1841
LEVEL 4	LEVEL 4	LEVEL4.D	05/27/04	1910
LEVEL 5	LEVEL 5	LEVEL5.D	05/27/04	1939
LEVEL 6	LEVEL 6	LEVEL6.D	05/27/04	2008
LEVEL 7	LEVEL 7	LEVEL7.D	05/27/04	2037

5B

SEMI-VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK

DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

Lab File ID: T1-0528.D DFTPP Injection Date: 05/28/04

Instrument ID: MSC DFTPP Injection Time: 1137

Mass	Ion Abundance Criteria	% Relative		Q
51	30% to 60% of mass 198	119605	(38.1)	
68	less than 2% of mass 69	0	(0.0)	
69	mass 69 relative abundance	113813	(100.0)	
70	less than 2% of mass 69	438	(0.4)	
127	40% to 60% of mass 198	139440	(44.4)	
197	less than 1% of mass 198	0	(0.0)	
198	base peak, 100% relative abundance	314026	(100.0)	
199	5% to 9% of mass 198	21008	(6.7)	
275	10% to 30% of mass 198	82338	(26.2)	
365	greater than 1% of mass 198	8046	(2.6)	
441	present, but less than mass 443	32717	(73.1)	
442	greater than 40% of mass 198	228650	(72.8)	
443	17% to 23% of mass 442	44738	(19.6)	

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

EPA SAMPLE NO.	LAB SAMPLE NO.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
CV1-0528	CV1-0528	CV1-0528.D	05/28/04	1151
ICV-0528	ICV-0528	ICV-0528.D	05/28/04	1220
SB1-0521	SB1-0521	SB1-0521.D	05/28/04	1436
BS1S0521	BS1S0521	BS1S0521.D	05/28/04	1505
BD1S0521	BD1S0521	BD1S0521.D	05/28/04	1534

5B

SEMI-VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK

DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

Lab File ID: T1-0604.D DFTPP Injection Date: 06/04/04

Instrument ID: MSC DFTPP Injection Time: 1740

Mass	Ion Abundance Criteria	% Relative		Q
51	30% to 60% of mass 198	72754	(41.4)	
68	less than 2% of mass 69	0	(0.0)	
69	mass 69 relative abundance	66632	(100.0)	
70	less than 2% of mass 69	0	(0.0)	
127	40% to 60% of mass 198	78290	(44.6)	
197	less than 1% of mass 198	0	(0.0)	
198	base peak, 100% relative abundance	175552	(100.0)	
199	5% to 9% of mass 198	12009	(6.8)	
275	10% to 30% of mass 198	46266	(26.4)	
365	greater than 1% of mass 198	4968	(2.8)	
441	present, but less than mass 443	18396	(73.0)	
442	greater than 40% of mass 198	132490	(75.5)	
443	17% to 23% of mass 442	25208	(19.0)	

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

EPA SAMPLE NO.	LAB SAMPLE NO.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
CV1-0604	CV1-0604	CV1-0604.D	06/04/04	1754
B1-0604	B1-0604	B1-0604.D	06/04/04	1950
IL22BCM0514040	D339201	339201.D	06/04/04	2019
B2-0604	B2-0604	B2-0604.D	06/04/04	2048

5B

SEMI-VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK

DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

Lab File ID: T1-0607.D DFTPP Injection Date: 06/07/04

Instrument ID: MSC DFTPP Injection Time: 1528

Mass	Ion Abundance Criteria	% Relative		Q
51	30% to 60% of mass 198	73674	(41.3)	
68	less than 2% of mass 69	0	(0.0)	
69	mass 69 relative abundance	66514	(100.0)	
70	less than 2% of mass 69	577	(0.9)	
127	40% to 60% of mass 198	77002	(43.2)	
197	less than 1% of mass 198	0	(0.0)	
198	base peak, 100% relative abundance	178346	(100.0)	
199	5% to 9% of mass 198	12457	(7.0)	
275	10% to 30% of mass 198	48232	(27.0)	
365	greater than 1% of mass 198	5006	(2.8)	
441	present, but less than mass 443	19184	(73.5)	
442	greater than 40% of mass 198	130938	(73.4)	
443	17% to 23% of mass 442	26090	(19.9)	

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

EPA SAMPLE NO.	LAB SAMPLE NO.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
CV1-0607	CV1-0607	CV1-0607.D	06/07/04	1542
IL22BCM0514040DL	D339201DL	339201DL.D	06/07/04	1709

5B

SEMI-VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK

DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM

Lab File ID: T1-0609.D DFTPP Injection Date: 06/09/04

Instrument ID: MSC DFTPP Injection Time: 1153

Mass	Ion Abundance Criteria	% Relative		Q
51	30% to 60% of mass 198	152632	(45.9)	
68	less than 2% of mass 69	655	(0.5)	
69	mass 69 relative abundance	135114	(100.0)	
70	less than 2% of mass 69	922	(0.7)	
127	40% to 60% of mass 198	155749	(46.9)	
197	less than 1% of mass 198	0	(0.0)	
198	base peak, 100% relative abundance	332288	(100.0)	
199	5% to 9% of mass 198	22929	(6.9)	
275	10% to 30% of mass 198	85402	(25.7)	
365	greater than 1% of mass 198	9345	(2.8)	
441	present, but less than mass 443	34045	(75.3)	
442	greater than 40% of mass 198	236408	(71.1)	
443	17% to 23% of mass 442	45213	(19.1)	

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

EPA SAMPLE NO.	LAB SAMPLE NO.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
CV1-0609	CV1-0609	CV1-0609.D	06/09/04	1207
IL22BCM0514040MS	D339201MS	339201MS.D	06/09/04	1656
IL22BCM0514040MSD	D339201MSD	339201SD.D	06/09/04	1725

6C

SEMI-VOLATILE ORGANICS INITIAL CALIBRATION DATA

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM Calibration Date(s): 05/27/04 05/27/04

Instrument Name: MSC Calibration Times: 1743 2037

GC Column: HP-5MS ID: 0.25 (mm) Concentration Units: ug/L

Initial Calibration	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6
Calibration File	LEVEL1A.D	LEVEL2.D	LEVEL3.D	LEVEL4.D	LEVEL5.D	LEVEL6.D

Compound	Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5	Std 6	RF 6
Naphthalene	25	0.847	50	0.845	100	0.844	250	0.801	500	0.807	1000	0.795
2-Methylnaphthalene	25	0.534	50	0.545	100	0.568	250	0.547	500	0.558	1000	0.545
1-Methylnaphthalene	25	0.524	50	0.537	100	0.535	250	0.500	500	0.506	1000	0.497
1-Methylnaphthalene-d10	28.4	0.442	56.8	0.441	114	0.443	284	0.421	568	0.420	1136	0.409
Acenaphthylene	25	1.363	50	1.384	100	1.448	250	1.426	500	1.460	1000	1.433
Acenaphthene	25	0.867	50	0.864	100	0.890	250	0.860	500	0.865	1000	0.854
Dibenzofuran	25	1.447	50	1.456	100	1.479	250	1.395	500	1.407	1000	1.348
Fluorene	25	1.127	50	1.111	100	1.130	250	1.067	500	1.083	1000	1.055
Phenanthrene	25	0.926	50	0.926	100	0.939	250	0.894	500	0.889	1000	0.863
Anthracene	25	0.763	50	0.793	100	0.814	250	0.805	500	0.829	1000	0.813
Fluoranthene-d10	6	0.786	12	0.799	24	0.813	60	0.818	120	0.852	240	0.862
Fluoranthene	25	0.898	50	0.915	100	0.926	250	0.906	500	0.912	1000	0.890
Pyrene	25	0.950	50	0.948	100	0.951	250	0.937	500	0.946	1000	0.929
Terphenyl-d14	4.8	0.637	9.6	0.634	19.2	0.637	48	0.636	96	0.670	192	0.683
Benzo(a)anthracene	25	0.998	50	0.997	100	1.025	250	1.002	500	1.023	1000	0.995
Chrysene	25	0.915	50	0.922	100	0.949	250	0.909	500	0.920	1000	0.897
Benzo(a)pyrene-d12	4.7	0.499	9.4	0.515	18.8	0.530	47	0.566	94	0.626	188	0.671
Benzo(b)fluoroanthene	25	1.147	50	1.132	100	1.209	250	1.199	500	1.202	1000	1.184
Benzo(k)fluoranthene	25	1.185	50	1.099	100	1.175	250	1.144	500	1.177	1000	1.133
Benzo(a)pyrene	25	0.900	50	0.902	100	0.961	250	0.967	500	1.016	1000	1.021
Indeno(1,2,3-c,d)pyrene	25	0.771	50	0.775	100	0.798	250	0.861	500	0.930	1000	0.944
Benzo(g,h,i)perylene	25	0.767	50	0.751	100	0.761	250	0.785	500	0.826	1000	0.832

* SPCCs # CCCs

SEMI-VOLATILE ORGANICS INITIAL CALIBRATION DATA

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM Calibration Date(s): 05/27/04 05/27/04

Instrument Name: MSC Calibration Times: 1743 2037

GC Column: HP-5MS ID: 0.25 (mm) Concentration Units: ug/L

Initial Calibration LEVEL 7

Calibration File LEVEL7.D

Compound	Std 7	RF 7										
Naphthalene	2000	0.761										
2-Methylnaphthalene	2000	0.522										
1-Methylnaphthalene	2000	0.475										
1-Methylnaphthalene-d10	2272	0.389										
Acenaphthylene	2000	1.341										
Acenaphthene	2000	0.811										
Dibenzofuran	2000	1.250										
Fluorene	2000	0.983										
Phenanthrene	2000	0.805										
Anthracene	2000	0.756										
Fluoranthene-d10	480	0.824										
Fluoranthene	2000	0.822										
Pyrene	2000	0.857										
Terphenyl-d14	384	0.654										
Benzo(a)anthracene	2000	0.933										
Chrysene	2000	0.850										
Benzo(a)pyrene-d12	376	0.684										
Benzo(b)fluoroanthene	2000	1.117										
Benzo(k)fluoranthene	2000	1.101										
Benzo(a)pyrene	2000	0.989										
Indeno(1,2,3-c,d)pyrene	2000	0.942										
Benzo(g,h,i)perylene	2000	0.825										

* SPCCs # CCCs

SEMI-VOLATILE ORGANICS INITIAL CALIBRATION DATA

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW8270SIM Calibration Date(s): 05/27/04 05/27/04

Instrument Name: MSC Calibration Times: 1743 2037

GC Column: HP-5MS ID: 0.25 (mm) Concentration Units: ug/L

Initial Calibration	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7
Calibration File	LEVEL1A.D	LEVEL2.D	LEVEL3.D	LEVEL4.D	LEVEL5.D	LEVEL6.D	LEVEL7.D

Analyte	Curve Type	Ave. RF	% RSD	mean %RSD	r	COD	Q
Naphthalene	AVG	0.814	3.99	4.19			
2-Methylnaphthalene	AVG	0.546	2.73	4.19			
1-Methylnaphthalene	AVG	0.511	4.41	4.19			
1-Methylnaphthalene-d10	AVG	0.424	4.79	4.19			
Acenaphthylene	AVG	1.408	3.23	4.19			
Acenaphthene	AVG	0.859	2.76	4.19			
Dibenzofuran	AVG	1.397	5.60	4.19			
Fluorene	AVG	1.080	4.75	4.19			
Phenanthrene	AVG	0.892	5.21	4.19			
Anthracene	AVG	0.796	3.40	4.19			
Fluoranthene-d10	AVG	0.822	3.28	4.19			
Fluoranthene	AVG	0.896	3.84	4.19			
Pyrene	AVG	0.931	3.62	4.19			
Terphenyl-d14	AVG	0.650	3.02	4.19			
Benzo(a)anthracene	AVG	0.996	3.05	4.19			
Chrysene	AVG	0.909	3.35	4.19			
Benzo(a)pyrene-d12	AVG	0.585	12.98	4.19			
Benzo(b)fluoroanthene	AVG	1.170	3.19	4.19			
Benzo(k)fluoranthene	AVG	1.145	3.12	4.19			
Benzo(a)pyrene	AVG	0.965	5.09	4.19			
Indeno(1,2,3-c,d)pyrene	AVG	0.860	9.20	4.19			
Benzo(g,h,i)perylene	AVG	0.792	4.31	4.19			

* SPCCs # CCCs

SEMI-VOLATILE CONTINUING CALIBRATION CHECK

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Instrument ID: MSC

Calibration Date/Time: 05/28/04 1220

Lab File ID: ICV-0528.D

Init. Calib. Date(s): 05/27/04 05/27/04

EPA Sample No: ICV-0528

Init. Calib. Time(s): 1743 2037

Heat Purge: (Y/N) N

GC Column: HP-5MS ID: 0.25 (mm)

COMPOUND	EXPECTED	FOUND	RRF	MIN RRF	%D	MAX %D	Q
Naphthalene	500	430	0.701	0.700	-13.91	20.5	
2-Methylnaphthalene	500	432	0.472	0.700	-13.51	20.5	
1-Methylnaphthalene	500	417	0.426	0.700	-16.65	20.5	
Acenaphthylene	500	603	1.698	1.300	20.6	20.5	
Acenaphthene	500	555	0.953	0.800	11.0	20.5	
Dibenzofuran	500	539	1.507	0.900	7.87	20.5	
Fluorene	500	561	1.211	0.900	12.2	20.5	
Phenanthrene	500	558	0.995	0.700	11.6	20.5	
Anthracene	500	617	0.982	0.700	23.3	20.5	
Fluoranthene	500	599	1.073	0.600	19.9	20.5	
Pyrene	500	586	1.091	0.600	17.1	20.5	
Benzo(a)anthracene	500	522	1.040	0.800	4.41	20.5	
Chrysene	500	550	0.999	0.700	9.94	20.5	
Benzo(b)fluoroanthene	500	575	1.345	0.700	14.9	20.5	
Benzo(k)fluoranthene	500	539	1.234	0.700	7.80	20.5	
Benzo(a)pyrene	500	598	1.154	0.700	19.5	20.5	
Indeno(1,2,3-c,d)pyrene	500	589	1.014	0.500	17.8	20.5	
Benzo(g,h,i)perylene	500	593	0.940	0.500	18.6	20.5	

* SPCCs # CCCs

Mean Absolute %D: 14.0

SEMI-VOLATILE CONTINUING CALIBRATION CHECK

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Instrument ID: MSC

Calibration Date/Time: 05/28/04 1151

Lab File ID: CV1-0528.D

Init. Calib. Date(s): 05/27/04 05/27/04

EPA Sample No: CV1-0528

Init. Calib. Time(s): 1743 2037

Heat Purge: (Y/N) N

GC Column: HP-5MS ID: 0.25 (mm)

COMPOUND	EXPECTED	FOUND	RRF	MIN RRF	%D	MAX %D	Q
Naphthalene	500	497	0.809	0.700	-0.65	20.5	
2-Methylnaphthalene	500	500	0.545	0.700	-0.08	20.5	
1-Methylnaphthalene	500	484	0.494	0.700	-3.23	20.5	
1-Methylnaphthalene-d10	568	552	0.412	0.100	-2.78	25	
Acenaphthylene	500	518	1.460	1.300	3.66	20.5	
Acenaphthene	500	495	0.851	0.800	-0.91	20.5	
Dibenzofuran	500	502	1.403	0.900	0.38	20.5	
Fluorene	500	484	1.045	0.900	-3.17	20.5	
2,4,6-Tribromophenol	500	537	0.231	0.100	7.45	25	
Phenanthrene	500	504	0.899	0.700	0.78	20.5	
Anthracene	500	521	0.830	0.700	4.21	20.5	
Fluoranthene-d10	120	135	0.927	0.100	12.8	25	
Fluoranthene	500	549	0.983	0.600	9.74	20.5	
Pyrene	500	551	1.026	0.600	10.1	20.5	
Terphenyl-d14	96.0	108	0.733	0.100	12.7	20.5	
Benzo(a)anthracene	500	514	1.024	0.800	2.80	20.5	
Chrysene	500	508	0.924	0.700	1.65	20.5	
Benzo(a)pyrene-d12	94.0	111	0.690	0.100	18.0	25	
Benzo(b)fluoroanthene	500	483	1.131	0.700	-3.32	20.5	
Benzo(k)fluoranthene	500	485	1.110	0.700	-3.02	20.5	
Benzo(a)pyrene	500	523	1.010	0.700	4.66	20.5	
Indeno(1,2,3-c,d)pyrene	500	593	1.020	0.500	18.5	20.5	
Benzo(g,h,i)perylene	500	571	0.904	0.500	14.1	20.5	

* SPCCs # CCCs

Mean Absolute %D: 5.8

SEMI-VOLATILE CONTINUING CALIBRATION CHECK

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Instrument ID: MSC

Calibration Date/Time: 06/04/04 1754

Lab File ID: CV1-0604.D

Init. Calib. Date(s): 05/27/04 05/27/04

EPA Sample No: CV1-0604

Init. Calib. Time(s): 1743 2037

Heat Purge: (Y/N) N

GC Column: HP-5MS ID: 0.25 (mm)

COMPOUND	EXPECTED	FOUND	RRF	MIN RRF	%D	MAX %D	Q
Naphthalene	500	495	0.806	0.700	-1.01	20.5	
2-Methylnaphthalene	500	486	0.531	0.700	-2.71	20.5	
1-Methylnaphthalene	500	502	0.513	0.700	0.36	20.5	
1-Methylnaphthalene-d10	568	561	0.419	0.100	-1.20	25	
Acenaphthylene	500	567	1.596	1.300	13.4	20.5	
Acenaphthene	500	544	0.934	0.800	8.80	20.5	
Dibenzofuran	500	531	1.483	0.900	6.10	20.5	
Fluorene	500	525	1.133	0.900	4.92	20.5	
2,4,6-Tribromophenol	500	557	0.240	0.100	11.4	25	
Phenanthrene	500	454	0.810	0.700	-9.20	20.5	
Anthracene	500	560	0.891	0.700	11.9	20.5	
Fluoranthene-d10	120	124	0.852	0.100	3.65	25	
Fluoranthene	500	511	0.915	0.600	2.17	20.5	
Pyrene	500	506	0.943	0.600	1.22	20.5	
Terphenyl-d14	96.0	95.2	0.645	0.100	-0.89	20.5	
Benzo(a)anthracene	500	506	1.008	0.800	1.22	20.5	
Chrysene	500	542	0.985	0.700	8.40	20.5	
Benzo(a)pyrene-d12	94.0	88.9	0.553	0.100	-5.48	25	
Benzo(b)fluoroanthene	500	461	1.078	0.700	-7.83	20.5	
Benzo(k)fluoranthene	500	471	1.078	0.700	-5.82	20.5	
Benzo(a)pyrene	500	536	1.034	0.700	7.10	20.5	
Indeno(1,2,3-c,d)pyrene	500	445	0.765	0.500	-11.07	20.5	
Benzo(g,h,i)perylene	500	408	0.646	0.500	-18.48	20.5	

* SPCCs # CCCs

Mean Absolute %D: 6.0

7B

SEMI-VOLATILE CONTINUING CALIBRATION CHECK

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Instrument ID: MSC

Calibration Date/Time: 06/07/04 1542

Lab File ID: CV1-0607.D

Init. Calib. Date(s): 05/27/04 05/27/04

EPA Sample No: CV1-0607

Init. Calib. Time(s): 1743 2037

Heat Purge: (Y/N) N

GC Column: HP-5MS ID: 0.25 (mm)

COMPOUND	EXPECTED	FOUND	RRF	MIN RRF	%D	MAX %D	Q
Naphthalene	500	501	0.815	0.700	0.14	20.5	
2-Methylnaphthalene	500	500	0.546	0.700	0.02	20.5	
1-Methylnaphthalene	500	539	0.550	0.700	7.71	20.5	
1-Methylnaphthalene-d10	568	557	0.416	0.100	-1.85	25	
Acenaphthylene	500	575	1.620	1.300	15.1	20.5	
Acenaphthene	500	547	0.939	0.800	9.41	20.5	
Dibenzofuran	500	533	1.489	0.900	6.55	20.5	
Fluorene	500	521	1.124	0.900	4.15	20.5	
2,4,6-Tribromophenol	500	534	0.230	0.100	6.70	25	
Phenanthrene	500	442	0.789	0.700	-11.58	20.5	
Anthracene	500	579	0.921	0.700	15.7	20.5	
Fluoranthene-d10	120	127	0.868	0.100	5.52	25	
Fluoranthene	500	516	0.923	0.600	3.10	20.5	
Pyrene	500	508	0.947	0.600	1.67	20.5	
Terphenyl-d14	96.0	94.5	0.640	0.100	-1.57	20.5	
Benzo(a)anthracene	500	494	0.984	0.800	-1.22	20.5	
Chrysene	500	554	1.008	0.700	10.9	20.5	
Benzo(a)pyrene-d12	94.0	93.6	0.582	0.100	-0.48	25	
Benzo(b)fluoroanthene	500	464	1.086	0.700	-7.15	20.5	
Benzo(k)fluoranthene	500	579	1.325	0.700	15.8	20.5	
Benzo(a)pyrene	500	515	0.994	0.700	3.01	20.5	
Indeno(1,2,3-c,d)pyrene	500	440	0.757	0.500	-12.01	20.5	
Benzo(g,h,i)perylene	500	409	0.648	0.500	-18.23	20.5	

* SPCCs # CCCs

Mean Absolute %D: 6.6

SEMI-VOLATILE CONTINUING CALIBRATION CHECK

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Instrument ID: MSC

Calibration Date/Time: 06/09/04 1207

Lab File ID: CV1-0609.D

Init. Calib. Date(s): 05/27/04 05/27/04

EPA Sample No: CV1-0609

Init. Calib. Time(s): 1743 2037

Heat Purge: (Y/N) N

GC Column: HP-5MS ID: 0.25 (mm)

COMPOUND	EXPECTED	FOUND	RRF	MIN RRF	%D	MAX %D	Q
Naphthalene	500	499	0.813	0.700	-0.17	20.5	
2-Methylnaphthalene	500	480	0.524	0.700	-3.97	20.5	
1-Methylnaphthalene	500	496	0.506	0.700	-0.86	20.5	
1-Methylnaphthalene-d10	568	549	0.409	0.100	-3.40	25	
Acenaphthylene	500	574	1.616	1.300	14.8	20.5	
Acenaphthene	500	542	0.931	0.800	8.47	20.5	
Dibenzofuran	500	511	1.427	0.900	2.15	20.5	
Fluorene	500	517	1.117	0.900	3.49	20.5	
2,4,6-Tribromophenol	500	625	0.269	0.100	25.0	25	
Phenanthrene	500	456	0.814	0.700	-8.74	20.5	
Anthracene	500	567	0.903	0.700	13.5	20.5	
Fluoranthene-d10	120	125	0.854	0.100	3.90	25	
Fluoranthene	500	510	0.913	0.600	1.95	20.5	
Pyrene	500	506	0.943	0.600	1.28	20.5	
Terphenyl-d14	96.0	94.9	0.643	0.100	-1.14	20.5	
Benzo(a)anthracene	500	504	1.004	0.800	0.74	20.5	
Chrysene	500	564	1.025	0.700	12.8	20.5	
Benzo(a)pyrene-d12	94.0	110	0.682	0.100	16.7	25	
Benzo(b)fluoroanthene	500	427	0.999	0.700	-14.65	20.5	
Benzo(k)fluoranthene	500	612	1.401	0.700	22.4	20.5	
Benzo(a)pyrene	500	528	1.019	0.700	5.54	20.5	
Indeno(1,2,3-c,d)pyrene	500	543	0.933	0.500	8.51	20.5	
Benzo(g,h,i)perylene	500	526	0.834	0.500	5.29	20.5	

Mean Absolute %D: 7.5

* SPCCs # CCCs

8B

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0528

Date Analyzed: 05/28/04

Lab File ID: CV1-0528.D

Time Analyzed: 1151

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS1		IS2		IS3	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		62963	8.87	32989	11.2	62016	13.1
UPPER LIMIT		125926	9.37	65978	11.7	124032	13.6
LOWER LIMIT		31481.5	8.37	16494.5	10.7	31008	12.6
EPA SAMPLE ID	LAB ID						
ICV-0528	ICV-0528	76462	8.87	32567	11.2	57221	13.1
SB1-0521	SB1-0521	66274	8.87	36166	11.2	63852	13.1
BS1S0521	BS1S0521	82936	8.87	37043	11.2	65985	13.1
BD1S0521	BD1S0521	78617	8.87	34308	11.2	61256	13.1

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

8C

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0528

Date Analyzed: 05/28/04

Lab File ID: CV1-0528.D

Time Analyzed: 1151

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS4		IS5		IS6	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		54817	16.5	45743	18.6		
UPPER LIMIT		109634	17	91486	19.1		
LOWER LIMIT		27408.5	16	22871.5	18.1		
EPA SAMPLE ID	LAB ID						
ICV-0528	ICV-0528	49302	16.4	35500	18.6		
SB1-0521	SB1-0521	56530	16.5	38232	18.6		
BS1S0521	BS1S0521	57009	16.4	41939	18.6		
BD1S0521	BD1S0521	51517	16.4	38279	18.6		

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

8B

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0604

Date Analyzed: 06/04/04

Lab File ID: CV1-0604.D

Time Analyzed: 1754

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS1		IS2		IS3	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		74499	8.86	40534	11.2	78852	13.1
UPPER LIMIT		148998	9.36	81068	11.7	157704	13.6
LOWER LIMIT		37249.5	8.36	20267	10.7	39426	12.6
EPA SAMPLE ID	LAB ID						
B1-0604	B1-0604	80872	8.86	44215	11.2	83716	13.1
IL22BCM0514040	D339201	76757	8.86	40116	11.2	76329	13.1
B2-0604	B2-0604	76159	8.86	42338	11.2	83614	13.1

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

8C

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0604

Date Analyzed: 06/04/04

Lab File ID: CV1-0604.D

Time Analyzed: 1754

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS4		IS5		IS6	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		52452	16.5	33225	18.6		
UPPER LIMIT		104904	17	66450	19.1		
LOWER LIMIT		26226	16	16612.5	18.1		
EPA SAMPLE ID	LAB ID						
B1-0604	B1-0604	48448	16.5	22910	18.6		
IL22BCM0514040	D339201	50940	16.5	49118	18.6		
B2-0604	B2-0604	52375	16.5	32569	18.6		

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

8B

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0607

Date Analyzed: 06/07/04

Lab File ID: CV1-0607.D

Time Analyzed: 1542

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS1		IS2		IS3	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		69231	8.86	37946	11.2	75240	13.1
UPPER LIMIT		138462	9.36	75892	11.7	150480	13.6
LOWER LIMIT		34615.5	8.36	18973	10.7	37620	12.6
EPA SAMPLE ID	LAB ID						
IL22BCM0514040DL	D339201DL	75264	8.86	39998	11.2	78610	13.1

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

8C

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0607

Date Analyzed: 06/07/04

Lab File ID: CV1-0607.D

Time Analyzed: 1542

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS4		IS5		IS6	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		48307	16.5	32762	18.6		
UPPER LIMIT		96614	17	65524	19.1		
LOWER LIMIT		24153.5	16	16381	18.1		
EPA SAMPLE ID	LAB ID						
IL22BCM0514040DL	D339201DL	53721	16.4	44675	18.6		

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0609

Date Analyzed: 06/09/04

Lab File ID: CV1-0609.D

Time Analyzed: 1207

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS1		IS2		IS3	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		73046	8.86	39755	11.2	74686	13.1
UPPER LIMIT		146092	9.36	79510	11.7	149372	13.6
LOWER LIMIT		36523	8.36	19877.5	10.7	37343	12.6
EPA SAMPLE ID	LAB ID						
IL22BCM0514040MS	D339201MS	62296	8.85	32046	11.2	61908	13.1
IL22BCM0514040MSD	D339201MSD	66180	8.85	33991	11.2	65622	13.1

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

SEMI-VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

SDG No.: D3392

Analysis Method: SW8270SIM

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: CV1-0609

Date Analyzed: 06/09/04

Lab File ID: CV1-0609.D

Time Analyzed: 1207

Instrument Name: MSC

Heat Purge: (Y/N)

GC Column: HP-5MS ID: 0.25 (mm)

		IS4		IS5		IS6	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
REFERENCE CAL		50850	16.4	41418	18.6		
UPPER LIMIT		101700	16.9	82836	19.1		
LOWER LIMIT		25425	15.9	20709	18.1		
EPA SAMPLE ID	LAB ID						
IL22BCM0514040MS	D339201MS	41119	16.4	30198	18.6		
IL22BCM0514040MSD	D339201MSD	40692	16.4	28065	18.6		

IS1: Naphthalene-d8

IS2: Acenaphthene-d10

IS3: Phenanthrene-d10

IS4: Chrysene-d12

IS5: Perylene-d12

IS6:

AREA UPPER LIMIT = + 100% of Internal Standard Area
AREA LOWER LIMIT = - 50% of Internal Standard Area
RT UPPER LIMIT = + 0.50 of Internal Standard RT
RT LOWER LIMIT = - 0.50 of Internal Standard RT

Column used to flag values outside of QC limits with an asterisk

CH2MHILL
Applied Sciences Group

CH2M HILL
Applied Sciences Labortory
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0276

06/15/04

MDL Study Report

Analytical Method: SW8270SIM
Instrument ID: MSC
Matrix: Soil
Concentration Units: ug/Kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Naphthalene	06/04/04	1	3.06	3.26	2.95	3.35	3.00	2.89	2.88	2.95	0.0579	**0.521**
Acenaphthylene	06/04/04	1	2.97	3.25	2.81	3.18	2.88	2.72	2.84	2.92	0.0614	**0.552**
Acenaphthene	06/04/04	1	2.93	3.27	2.78	3.16	3.06	2.67	2.69	2.85	0.0729	**0.656**
Dibenzofuran	06/04/04	1	3.15	3.38	2.97	3.25	3.16	2.89	2.85	3.02	0.0611	**0.550**
Fluorene	06/04/04	1	3.32	3.34	3.15	3.20	3.26	2.93	2.90	3.29	0.0575	**0.517**
Anthracene	06/04/04	1	3.34	3.61	3.12	3.59	3.31	3.01	3.20	3.20	0.0717	**0.645**
Fluoranthene	06/04/04	1	3.60	4.04	3.52	3.73	3.70	3.47	3.58	3.47	0.0636	**0.572**
Benzo(a)pyrene	06/04/04	1	3.84	4.23	3.23	3.29	3.45	2.98	3.11	3.28	0.138	**1.24**
Indeno(1,2,3-c,d)pyrene	06/04/04	1	3.93	4.47	3.66	3.70	3.38	3.26	3.22	3.41	0.138	**1.24**
2-Methylnaphthalene	06/04/04	1	2.86	3.02	2.74	3.00	2.83	2.78	2.59	2.76	0.0471	**0.423**
1-Methylnaphthalene	06/04/04	2	5.33	5.63	5.14	5.81	5.40	5.26	4.90	5.35	0.0933	**0.839**
Phenanthrene	06/04/04	1	3.50	3.82	3.32	3.59	3.39	3.25	3.35	3.33	0.0618	**0.556**
Pyrene	06/04/04	1	3.58	4.03	3.47	3.64	3.61	3.38	3.51	3.45	0.0662	**0.595**
Benzo(a)anthracene	06/04/04	1	3.18	3.46	3.07	3.16	3.10	2.94	3.06	2.96	0.0545	**0.491**
Chrysene	06/04/04	1	4.23	4.69	4.16	4.38	4.22	3.98	4.15	4.13	0.0709	**0.638**
Benzo(b)fluoroanthene	06/04/04	1	3.63	3.58	3.21	3.19	3.14	3.06	3.04	3.07	0.0782	**0.704**
Benzo(k)fluoranthene	06/04/04	1	3.58	3.79	3.18	3.18	3.09	2.96	2.94	2.87	0.108	**0.973**
Benzo(g,h,i)perylene	06/04/04	1	4.02	4.85	3.92	3.98	3.85	3.54	3.56	3.72	0.138	**1.24**

PESTICIDES BY METHOD SW8081

CASE NARRATIVE
PESTICIDES BY SW8081A

Analytical Method: SW8081A Batch No.: D3392

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 182032.SL.BA.2B.01

Base/Command: Portland—BES Source Control Prime Contractor.:

I. Holding Times:
Holding times are determined from sample kept frozen at –20C. All acceptance criteria were met. *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations*" (EPA 823-B-95-001, April 1995)

II. Analysis:

A. Calibration:
Calibration verification CV7-0603 did not meet acceptance criteria (85-115%) on the primary detector for Heptachlor (84.7%). Several analytes failed on the confirmation detector due to contamination of the system caused by the sample matrix. All samples were re-analyzed multiple times to achieve passing CV's throughout the run, but was never successful.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate Sample(s):
Matrix spike/spike duplicate did not recover due to dilution of sample necessary for analysis on instrument.

D. Surrogate Recoveries:
All acceptance criteria were met.

E. Laboratory Control Spike(LCS)
Blank spike (BS1S0602) recovered outside of acceptance criteria (50-150%) for methoxychlor at 716% and 759% on the primary and secondary column, respectively. A low level methoxychlor detection (1.9ug/Kg with >40% RPD on two detectors; PQL=1.25) was seen in the blank sample. The contaminant was likely caused by residue in the GPC column after calibration (methoxychlor is a calibration standard). The sample was not re-extracted for this reason, but was compared to the first extraction of this batch (05/26/04); no significant difference was seen in sample methoxychlor values.

F. Analytical Exception:
a-Chlordane and t-Nonachlor co-elute on the primary column (ECDA, STX-CLP column); all results should be quantitated only using the second column set (ECDB, STX-CLP2 column) for these analytes.

G. Other:
Sample IL22BCM0514040 (D339201) and all QC sample extracts were cleaned using Carboprep® 90 cartridges and gel permeation cleanup. In addition, two types of silica gel cleanup were tested for efficiency including neutral (activated) silica gel, and 3.3% deactivated silica gel eluted with hexane and methylene chloride into two fractions. The silica gel yielded similar results to that of the GPC cleanup, but did not remove the high sulfur background from the extracts.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Mik Shaver Date: 06/10/04

Reviewed by: [signature] Date: 6/11/04

SAMPLE DATA SUMMARY

1A

PESTICIDES ANALYSIS DATA SHEET

Field Sample ID: **IL22BCM0514040**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **D339201**

Sample Amt.: 20 g Lab File ID: 030B3401.D

% Moisture: 41 Decanted: N Date Received: 05/17/04

Extraction: Sonc Date Extracted: 06/02/04

Extract Vol.: 2 ml Date Analyzed: 06/04/04

Injection Vol.: 2.0 ul Dilution Factor: 5

GPC Cleanup: Y pH: Sulfur Cleanup: N

Concentration Units: ug/Kg

CAS #	Analyte	MDL	PQL	Result	Confirm	Q
319-84-6	a-BHC	0.27	2.10	2.94	1.79	P
58-89-9	g-BHC (Lindane)	0.70	1.05	1.26	5.65	P
319-85-7	b-BHC	0.25	1.05	9.65	1.58	P
319-86-8	d-BHC	0.45	2.10	3.15	1.88	P
76-44-8	Heptachlor	0.39	1.05	4.25	4.57	
309-00-2	Aldrin	0.75	1.05	1.85	5.07	P
1024-57-3	Heptachlor epoxide	0.22	2.10	27.4	8.99	P
5103-74-2	g-Chlordane	0.18	2.10	8.83	37.8	P
5103-71-9	a-Chlordane	0.21	2.10	6.14	5.42	
72-55-9	4,4-DDE	0.23	4.21	14.2	29.3	P
959-98-8	Endosulfan I	0.17	2.10	4.11	4.62	
60-57-1	Dieldrin	0.28	1.05	12.0	3.17	P
72-20-8	Endrin	0.31	1.05	3.55	25.0	P
72-54-8	4,4-DDD	0.19	4.21	68.9	58.5	E
33213-65-9	Endosulfan II	1.50	4.21	13.1	2.95	P
50-29-3	4,4-DDT	0.37	4.21	63.4	79.0	E
7421-93-4	Endrin aldehyde	0.76	4.21	127	131	E
72-43-5	Methoxychlor	1.33	10.5	22.2	64.6	P
1031-07-8	Endosulfan sulfate	0.24	4.21	5.49	0.84	P
53494-70-5	Endrin ketone	0.93	4.21	4.21		U
27304-13-8	Oxychlordane	0.25	2.10	1.31	8.81	JP
39765-80-5	t-Nonachlor	0.38	2.10	5.64	16.5	P
5103-73-1	c-Nonachlor	0.19	2.10	4.60	15.0	P
8001-35-2	Toxaphene	18.7	210	210		U

Surrogate	% Rec.	QC Limits	Qualifier
Tetrachloro-m-xylene	100	35-135	
Decachlorobiphenyl	63.0	25-143	

Comments:

1A

PESTICIDES ANALYSIS DATA SHEET

Field Sample ID: **IL22BCM0514040 DL**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **D339201 DL**

Sample Amt.: 20 g Lab File ID: 036B4301.D

% Moisture: 41 Decanted: N Date Received: 05/17/04

Extraction: Sonc Date Extracted: 06/02/04

Extract Vol.: 2 ml Date Analyzed: 06/04/04

Injection Vol.: 2.0 ul Dilution Factor: 20

GPC Cleanup: Y pH: Sulfur Cleanup: N

Concentration Units: ug/Kg

CAS #	Analyte	MDL	PQL	Result	Confirm	Q
319-84-6	a-BHC	1.06	8.42	2.86	7.13	JP
58-89-9	g-BHC (Lindane)	2.81	4.21	4.21		U
319-85-7	b-BHC	1.00	4.21	17.1	1.85	P
319-86-8	d-BHC	1.79	8.42	7.40	7.17	J
76-44-8	Heptachlor	1.57	4.21	53.8	4.99	P
309-00-2	Aldrin	3.00	4.21	8.66	4.57	P
1024-57-3	Heptachlor epoxide	0.88	8.42	34.6	10.1	P
5103-74-2	g-Chlordane	0.72	8.42	7.63	37.6	JP
5103-71-9	a-Chlordane	0.83	8.42	10.1	5.35	P
72-55-9	4,4-DDE	0.93	16.8	15.9	24.7	JP
959-98-8	Endosulfan I	0.67	8.42	5.05	8.49	JP
60-57-1	Dieldrin	1.14	4.21	16.8	8.42	P
72-20-8	Endrin	1.22	4.21	6.10	18.7	P
72-54-8	4,4-DDD	0.74	16.8	126	51.9	P
33213-65-9	Endosulfan II	5.99	16.8	16.8		U
50-29-3	4,4-DDT	1.48	16.8	107	92.3	
7421-93-4	Endrin aldehyde	3.05	16.8	221	181	
72-43-5	Methoxychlor	5.30	42.1	31.7	88.7	JP
1031-07-8	Endosulfan sulfate	0.98	16.8	16.8		U
53494-70-5	Endrin ketone	3.73	16.8	16.8		U
27304-13-8	Oxychlordane	1.01	8.42	11.3	11.5	
39765-80-5	t-Nonachlor	1.52	8.42	8.6	22.6	P
5103-73-1	c-Nonachlor	0.77	8.42	10.2	30.6	P
8001-35-2	Toxaphene	74.8	842	842		U

Surrogate	% Rec.	QC Limits	Qualifier
Tetrachloro-m-xylene	134	35-135	
Decachlorobiphenyl	118	25-143	

Comments:

1A

PESTICIDES ANALYSIS DATA SHEET

Field Sample ID: **SB1-0602**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **SB1-0602**

Sample Amt.: 20 g Lab File ID: 027B3101.D

% Moisture: 0 Decanted: N Date Received: N/A

Extraction: Sonc Date Extracted: 06/02/04

Extract Vol.: 2 ml Date Analyzed: 06/04/04

Injection Vol.: 2.0 ul Dilution Factor: 1

GPC Cleanup: Y pH: Sulfur Cleanup: N

Concentration Units: ug/Kg

CAS #	Analyte	MDL	PQL	Result	Confirm	Q
319-84-6	a-BHC	0.032	0.25	0.25		U
58-89-9	g-BHC (Lindane)	0.083	0.13	0.13		U
319-85-7	b-BHC	0.030	0.13	0.13		U
319-86-8	d-BHC	0.053	0.25	0.25		U
76-44-8	Heptachlor	0.047	0.13	0.13		U
309-00-2	Aldrin	0.089	0.13	0.13		U
1024-57-3	Heptachlor epoxide	0.026	0.25	0.26	0.042	P
5103-74-2	g-Chlordane	0.021	0.25	0.25		U
5103-71-9	a-Chlordane	0.025	0.25	0.25		U
72-55-9	4,4-DDE	0.028	0.50	0.50		U
959-98-8	Endosulfan I	0.020	0.25	0.25		U
60-57-1	Dieldrin	0.034	0.13	0.13		U
72-20-8	Endrin	0.036	0.13	0.13		U
72-54-8	4,4-DDD	0.022	0.50	0.50		U
33213-65-9	Endosulfan II	0.18	0.50	0.50		U
50-29-3	4,4-DDT	0.044	0.50	0.50		U
7421-93-4	Endrin aldehyde	0.091	0.50	0.43	0.40	J
72-43-5	Methoxychlor	0.16	1.25	1.00	1.92	JP
1031-07-8	Endosulfan sulfate	0.029	0.50	0.50		U
53494-70-5	Endrin ketone	0.11	0.50	0.50		U
27304-13-8	Oxychlordane	0.030	0.25	0.25		U
39765-80-5	t-Nonachlor	0.045	0.25	0.25		U
5103-73-1	c-Nonachlor	0.023	0.25	0.25		U
8001-35-2	Toxaphene	2.22	25.0	25.0		U

Surrogate	% Rec.	QC Limits	Qualifier
Tetrachloro-m-xylene	76.0	35-135	
Decachlorobiphenyl	71.0	25-143	

Comments:

QC SUMMARY

PESTICIDES LABORATORY CONTROL SAMPLE SUMMARY

Analytical Method: SW8081A
Lab Name: CH2M HILL ASL
Concentration Units: ug/Kg
LCS ID: BS1S0602

SDG No.: D3392
Contract #: 182032.SL.BA.2B.01
Matrix: SOIL
Initial Calibration ID: PST0603A.M

Analyte	Expected	Found	% Rec.	QC Limits	Qualifier
a-BHC	2.50	2.48	99	50-150	
g-BHC (Lindane)	2.50	2.40	96	50-150	
b-BHC	2.50	2.36	94	50-150	
d-BHC	2.50	2.44	98	50-150	
Heptachlor	2.50	3.44	138	50-150	
Aldrin	2.50	2.54	102	50-150	
Heptachlor epoxide	2.50	2.41	96	50-150	
g-Chlordane	2.50	2.45	98	50-150	
a-Chlordane	2.50	2.23	89	50-150	
4,4-DDE	2.50	2.86	114	50-150	
Endosulfan I	2.50	2.24	90	50-150	
Dieldrin	2.50	2.55	102	50-150	
Endrin	2.50	2.58	103	50-150	
4,4-DDD	2.50	2.52	101	50-150	
Endosulfan II	2.50	2.57	103	50-150	
4,4-DDT	2.50	3.08	123	50-150	
Endrin aldehyde	2.50	2.85	114	50-150	
Methoxychlor	2.50	17.9	716	50-150	*
Endosulfan sulfate	2.50	2.51	100	50-150	
Endrin ketone	2.50	2.79	112	50-150	
Oxychlordane	10.0	6.30	63	50-150	
t-Nonachlor	10.0	8.85	89	50-150	
c-Nonachlor	10.0	7.19	72	50-150	
Tetrachloro-m-xylene (SS)	100	82.7	83	50-150	
Decachlorobiphenyl (SS)	100	75.2	75	50-150	

Comments:
a-Chlordane coelutes with t-nonachlor on the primary detector.

PESTICIDES LABORATORY CONTROL SAMPLE SUMMARY

Analytical Method: SW8081A
Lab Name: CH2M HILL ASL
Concentration Units: ug/Kg
LCS ID: BS2S0602

SDG No.: D3392
Contract #: 182032.SL.BA.2B.01
Matrix: SOIL
Initial Calibration ID: PST0603A.M

Analyte	Expected	Found	% Rec.	QC Limits	Qualifier
Toxaphene	25.0	28.4	114	31-136	

Comments:

PESTICIDES METHOD BLANK SUMMARY

Field Sample ID: **SB1-0602**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Lab File ID: 027B3101.D Lab Sample ID: **SB1-0602**
Matrix: SOIL Extraction: SepF
GPC Cleanup: Y Date Extracted: 06/02/04
Sulfur Cleanup: N Date Analyzed: 06/04/04
GC Column: STX-CLP / STX-CLP2 Time Analyzed: 05:04
Instrument ID: GC-T

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	Field Sample ID	Lab Sample ID	Lab File ID	Date Analyzed
01	BS1S0602	BS1S0602	C:\HPCHEM\1\DATA\060304T1\028B3201.D	06/04/04
02	BS2S0602	BS2S0602	C:\HPCHEM\1\DATA\060304T1\029B3301.D	06/04/04
03	IL22BCM0514040	D339201	C:\HPCHEM\1\DATA\060304T1\030B3401.D	06/04/04
04	IL22BCM0514040 DL	D339201 DL	C:\HPCHEM\1\DATA\060304T1\036B4301.D	06/04/04

Comments:

PESTICIDES INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Contract #: 182032.SL.BA.2B.01
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Instrument ID: GC-T
Calibration Date(s): 06/03/04
Initial Calibration ID: PST0603A.M
Calibration Time(s): 10:28 - 14:11

	Pesticide Calibration	Lab File ID:
Std 1:	LEVEL1 PEST (06/03)	003B0301.D
Std 2:	LEVEL2 PEST (06/03)	004B0401.D
Std 3:	LEVEL3 PEST (06/03)	005B0501.D
Std 4:	LEVEL4 PEST (06/03)	006B0601.D
Std 5:	LEVEL5 PEST (06/03)	007B0701.D
Std 6:	LEVEL6 PEST (06/03)	008B0801.D
Std 7:	LEVEL7 PEST (06/03)	009B0901.D
Std 8:	LEVEL8 PEST (06/03)	010B1001.D

		Lab File ID:
Std 1:		
Std 2:		
Std 3:		
Std 4:		
Std 5:		
Std 6:		
Std 7:		
Std 8:		

GC Column: STX-CLP Concentration Units: ng/ml

Analyte	STD 1	RF 1		RF 2	STD 3	RF 3	STD 4	RF 4	STD 5	RF 5	STD 6	RF 6	STD 7	RF 7	STD 8	RF 8
a-BHC	1.0	1.15352	2.0	1.14280	5.0	1.10839	10.0	1.11040	20.0	1.16876	50	1.20646	100	1.18321	200	1.13486
g-BHC (Lindane)	1.0	1.14321	2.0	1.13729	5.0	1.03841	10.0	0.99604	20.0	1.00773	50	1.00119	100	0.96581	200	0.91032
b-BHC	1.0	0.82146	2.0	0.69283	5.0	0.70960	10.0	0.65853	20.0	0.64040	50	0.59694	100	0.54239	200	0.49767
d-BHC	1.0	1.07961	2.0	0.99475	5.0	0.96235	10.0	0.97507	20.0	0.99643	50	1.03150	100	1.02819	200	0.96880
Heptachlor	1.0	1.01888	2.0	0.87841	5.0	0.80020	10.0	0.72085	20.0	0.66133	50	0.60098	100	0.60136	200	0.57739
Aldrin	1.0	1.42951	2.0	1.33701	5.0	1.34995	10.0	1.39724	20.0	1.49365	50	1.56285	100	1.51341	200	1.42228
Heptachlor Epoxide	1.0	1.43226	2.0	1.27966	5.0	1.27150	10.0	1.22906	20.0	1.24156	50	1.21474	100	1.12630	200	1.02330
g-Chlordane	1.0	1.76694	2.0	1.36761	5.0	1.30335	10.0	1.27157	20.0	1.37479	50	1.39385	100	1.36754	200	1.27967
a-Chlordane	1.0	1.54476	2.0	1.46743	5.0	1.41795	10.0	1.40523	20.0	1.43230	50	1.43207	100	1.38199	200	1.28388
4,4-DDE	2.0	0.76912	4.0	0.82367	10.0	0.88377	20.0	0.94555	40.0	0.98130	100	1.01346	200	0.96932	400	0.90281
Endosulfan I	1.0	1.76688	2.0	1.58322	5.0	1.48396	10.0	1.41367	20.0	1.45765	50	1.42826	100	1.30439	200	1.16062
Dieldrin	2.0	1.26038	4.0	1.30576	10.0	1.27888	20.0	1.30129	40.0	1.32862	100	1.31177	200	1.24713	400	1.15384
Endrin	2.0	1.01040	4.0	0.93324	10.0	0.96258	20.0	0.93090	40.0	0.93496	100	0.82542	200	0.81834	400	0.76800
4,4-DDD	2.0	0.73069	4.0	0.69478	10.0	0.69659	20.0	0.67757	40.0	0.68338	100	0.67382	200	0.65469	400	0.58982
Endosulfan II	2.0	1.15819	4.0	1.11253	10.0	1.10123	20.0	1.05457	40.0	1.09562	100	1.06133	200	0.99964	400	0.92813
4,4-DDT	2.0	0.53360	4.0	0.51011	10.0	0.52803	20.0	0.49141	40.0	0.45999	100	0.41770	200	0.46741	400	0.45018
Endrin Aldehyde	2.0	1.08869	4.0	1.06744	10.0	0.90127	20.0	0.94150	40.0	0.95138	100	0.90757	200	0.82491	400	0.77593
Methoxychlor	10.0	0.22483	20.0	0.23351	50.0	0.25746	100.0	0.24125	200.0	0.21578	500	0.17610	1000	0.17455	2000	0.16462
Endosulfan Sulfate	2.0	1.25424	4.0	1.15812	10.0	1.14487	20.0	1.09696	40.0	1.09603	100	1.02660	200	0.98029	400	0.93011
Endrin Ketone	2.0	1.50973	4.0	1.27323	10.0	1.20200	20.0	1.14190	40.0	1.10849	100	1.00559	200	0.94286	400	0.83834
TETRACHLORO-M-XYLENE (SS)	1.0	1.77609	2.0	1.73186	5.0	1.75953	10.0	1.78909	20.0	1.84429	50	1.84891	100	1.73497	200	1.58311
DECACHLOROBIPHENYL (SS)	2.0	2.06390	4.0	1.94702	10.0	1.79940	20.0	1.64403	40.0	1.49198	100	1.28580	200	1.15354	400	1.03167
1-BROMO-2-NITROBENZENE (IS)	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000

GC Column: STX-CLP2 Concentration Units: ng/ml

Analyte	STD 1	RF 1	STD 2	RF 2	STD 3	RF 3	STD 4	RF 4	STD 5	RF 5	STD 6	RF 6	STD 7	RF 7	STD 7	RF 7
a-BHC	1.0	0.53256	2.0	0.51475	5.0	0.53772	10.0	0.58622	20.0	0.68552	50	0.81581	100	0.84403	200	0.81815
g-BHC (Lindane)	1.0	0.47415	2.0	0.59551	5.0	0.56251	10.0	0.58155	20.0	0.63819	50	0.71126	100	0.72251	200	0.70243
b-BHC	1.0	0.31997	2.0	0.38340	5.0	0.38138	10.0	0.38431	20.0	0.38912	50	0.39681	100	0.38166	200	0.35651
d-BHC	1.0	0.45314	2.0	0.47188	5.0	0.48890	10.0	0.52924	20.0	0.60999	50	0.73219	100	0.76220	200	0.74067
Heptachlor	1.0	0.43136	2.0	0.41588	5.0	0.40402	10.0	0.38120	20.0	0.39726	50	0.41240	100	0.44786	200	0.44523
Aldrin	1.0	0.57169	2.0	0.56817	5.0	0.58828	10.0	0.62613	20.0	0.67952	50	0.77072	100	0.76881	200	0.72328
Heptachlor Epoxide	1.0	0.65322	2.0	0.63769	5.0	0.61917	10.0	0.61413	20.0	0.62673	50	0.66724	100	0.65810	200	0.61729
g-Chlordane	1.0	0.69181	2.0	0.71103	5.0	0.68109	10.0	0.68062	20.0	0.69628	50	0.74774	100	0.74423	200	0.69955
a-Chlordane	1.0	0.72269	2.0	0.67105	5.0	0.71133	10.0	0.69318	20.0	0.70841	50	0.74785	100	0.73568	200	0.68781
4,4-DDE	2.0	0.50220	4.0	0.50345	10.0	0.53364	20.0	0.58113	40.0	0.64053	100	0.72248	200	0.70415	400	0.65201
Endosulfan I	1.0	0.59684	2.0	0.57628	5.0	0.58110	10.0	0.57349	20.0	0.59942	50	0.64367	100	0.63756	200	0.60361
Dieldrin	2.0	0.58130	4.0	0.61447	10.0	0.58300	20.0	0.60535	40.0	0.65150	100	0.70746	200	0.69933	400	0.65083
Endrin	2.0	0.54097	4.0	0.51630	10.0	0.53030	20.0	0.53128	40.0	0.56454	100	0.56909	200	0.57361	400	0.55046
4,4-DDD	2.0	0.35090	4.0	0.34892	10.0	0.37336	20.0	0.39571	40.0	0.44627	100	0.50428	200	0.52280	400	0.49476
Endosulfan II	2.0	0.55764	4.0	0.56500	10.0	0.57211	20.0	0.56167	40.0	0.61175	100	0.63730	200	0.61553	400	0.57724
4,4-DDT	2.0	0.17220	4.0	0.18523	10.0	0.21031	20.0	0.21274	40.0	0.26025	100	0.28288	200	0.34188	400	0.36094
Endrin Aldehyde	2.0	0.50472	4.0	0.52709	10.0	0.48765	20.0	0.47618	40.0	0.49002	100	0.50266	200	0.46195	400	0.43509
Methoxychlor	10.0	0.07700	20.0	0.08262	50.0	0.10430	100.0	0.10631	200.0	0.12616	500	0.12041	1000	0.13157	2000	0.13314
Endosulfan Sulfate	2.0	0.52230	4.0	0.51403	10.0	0.51850	20.0	0.51518	40.0	0.53832	100	0.54348	200	0.52865	400	0.49210
Endrin Ketone	2.0	0.47257	4.0	0.44058	10.0	0.49336	20.0	0.52554	40.0	0.56616	100	0.57654	200	0.56939	400	0.52520
TETRACHLORO-M-XYLENE (SS)	1.0	0.64757	2.0	0.63640	5.0	0.63044	10.0	0.63582	20.0	0.65216	50	0.67725	100	0.63794	200	0.58184
DECACHLOROBIPHENYL (SS)	2.0	0.90947	4.0	0.88571	10.0	0.84806	20.0	0.80502	40.0	0.74966	100	0.70068	200	0.63384	400	0.56128
1-BROMO-2-NITROBENZENE (IS)	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000	100	1.00000

PESTICIDES INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Lab Code: CVO
Case No.: D3392
SAS No.: D3392
Contract #: 182032.SL.BA.2B.01
SDG No.: D3392
Instrument ID: GC-T
Calibration Date(s): 06/03/04
Initial Calibration ID: PST0603A.M
Calibration Time(s): 10:28 - 14:11

	Pesticide Calibration	Lab File ID:
Std 1:	LEVEL1 PEST (06/03)	003B0301.D
Std 2:	LEVEL2 PEST (06/03)	004B0401.D
Std 3:	LEVEL3 PEST (06/03)	005B0501.D
Std 4:	LEVEL4 PEST (06/03)	006B0601.D
Std 5:	LEVEL5 PEST (06/03)	007B0701.D
Std 6:	LEVEL6 PEST (06/03)	008B0801.D
Std 7:	LEVEL7 PEST (06/03)	009B0901.D
Std 8:	LEVEL8 PEST (06/03)	010B1001.D

	Dicofol/Mirex Calibration	Lab File ID:
Std 1:		
Std 2:		
Std 3:		
Std 4:		
Std 5:		
Std 6:		
Std 7:		
Std 7:		

GC Column: STX-CLP
Concentration Units: ng/ml

Analyte	Curve Fit	Avg. RRF	% RSD	Mean % RSD	R or COD	Q
a-BHC	AVG RSP	1.153363	3.2			
g-BHC (Lindane)	AVG RSP	1.041382	6.8			
b-BHC	QUAD	0.666022	13.4		0.99989	
d-BHC	AVG RSP	1.009699	4.0			
Heptachlor	QUAD	0.754571	20.5		0.99995	
Aldrin	AVG RSP	1.440518	5.9			
Heptachlor Epoxide	AVG RSP	1.256441	7.4			
g-Chlordane	AVG RSP	1.406521	11.7			
a-Chlordane	AVG RSP	1.440248	3.7			
4,4-DDE	AVG RSP	0.912311	9.9			
Endosulfan I	AVG RSP	1.491148	9.9			
Dieldrin	AVG RSP	1.290547	2.3			
Endrin	AVG RSP	0.916549	7.7			
4,4-DDD	AVG RSP	0.687362	3.5			
Endosulfan II	AVG RSP	1.083301	4.7			
4,4-DDT	AVG RSP	0.486894	8.5			
Endrin Aldehyde	AVG RSP	0.954681	9.8			
Methoxychlor	AVG RSP	0.217640	14.6			
Endosulfan Sulfate	AVG RSP	1.108158	8.1			
Endrin Ketone	AVG RSP	1.169111	16.0			
TETRACHLORO-M-XYLENE (SS)	AVG RSP	1.783534	2.7			
DECACHLOROBIPHENYL (SS)	AVG RSP	1.626522	20.7			
1-BROMO-2-NITROBENZENE (IS)	AVG RSP	1.000000	0.0	8.9		

GC Column: STX-CLP2
Concentration Units: ng/ml

Analyte	Curve Fit	Avg. RRF	% RSD	Mean % RSD	R or COD	Q
a-BHC	QUAD	0.645228	21.5		0.99980	
g-BHC (Lindane)	QUAD	0.615097	13.9		0.99991	
b-BHC	AVG RSP	0.376664	6.8			
d-BHC	QUAD	0.578218	21.9		0.99978	
Heptachlor	CUBIC	0.412855	5.3		1.00000	
Aldrin	AVG RSP	0.653331	13.5			
Heptachlor Epoxide	AVG RSP	0.639468	3.2			
g-Chlordane	AVG RSP	0.707542	4.0			
a-Chlordane	AVG RSP	0.712884	3.6			
4,4-DDE	AVG RSP	0.598225	15.4			
Endosulfan I	AVG RSP	0.601196	4.8			
Dieldrin	AVG RSP	0.634631	8.3			
Endrin	AVG RSP	0.546587	4.1			
4,4-DDD	AVG RSP	0.420320	17.1			
Endosulfan II	AVG RSP	0.588712	5.4			
4,4-DDT	CUBIC	0.237929	25.3		0.99998	
Endrin Aldehyde	AVG RSP	0.492896	4.3			
Methoxychlor	AVG RSP	0.106912	19.7			
Endosulfan Sulfate	AVG RSP	0.525779	2.2			
Endrin Ketone	AVG RSP	0.520592	10.2			
TETRACHLORO-M-XYLENE (SS)	AVG RSP	0.645370	2.5			
DECACHLOROBIPHENYL (SS)	QUAD	0.790350	12.8		0.99992	
1-BROMO-2-NITROBENZENE (IS)	AVG RSP	1.000000	0.0	10.3		

PESTICIDES INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Instrument ID: GC-T
Initial Calibration ID: TOX0603A.M
Contract #: 182032.SL.BA.2B.01
Calibration Date(s): 06/03/04
Calibration Time(s): 20:34 - 23:14

	Toxaphene Calibration	Lab File ID:
Std 1:	LEVEL1 TOX	020B2001.D
Std 2:	LEVEL2 TOX	021B2101.D
Std 3:	LEVEL3 TOX	022B2201.D
Std 4:	LEVEL4 TOX	023B2301.D
Std 5:	LEVEL5 TOX	024B2401.D
Std 6:	LEVEL6 TOX	025B2501.D

		Lab File ID:
Std 1:		
Std 2:		
Std 3:		
Std 4:		
Std 5:		
Std 6:		

GC Column: STX-CLP Concentration Units: ng/ml

Analyte	STD 1	RF 1	STD 2	RF 2	STD 3	RF 3	STD 4	RF 4	STD 5	RF 5	STD 6	RF 6	STD 7	RF 7
Toxaphene (peak 1)	50	0.032452	100	0.026967	250	0.027059	500	0.029344	750	0.038425	1000	0.035403		
Toxaphene (peak 2)	50	0.030187	100	0.024183	250	0.026479	500	0.029501	750	0.034738	1000	0.031587		
Toxaphene (peak 3)	50	0.031594	100	0.026629	250	0.029823	500	0.034373	750	0.045980	1000	0.036486		
Toxaphene (peak 4)	50	0.029530	100	0.025154	250	0.030637	500	0.035030	750	0.047535	1000	0.037867		
Toxaphene (peak 5)	50	0.013164	100	0.010036	250	0.011822	500	0.016698	750	0.023517	1000	0.023232		
1-BROMO-2-NITROBENZENE (IS)	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000		

GC Column: STX-CLP2 Concentration Units: ng/ml

Analyte	STD 1	RF 1	STD 2	RF 2	STD 3	RF 3	STD 4	RF 4	STD 5	RF 5	STD 6	RF 6	STD 7	RF 7
Toxaphene (peak 1)	50	0.019101	100	0.012875	250	0.015766	500	0.019563	750	0.030381	1000	0.026039		
Toxaphene (peak 2)	50	0.025839	100	0.014540	250	0.012576	500	0.014544	750	0.022243	1000	0.022876		
Toxaphene (peak 3)	50	0.018571	100	0.012400	250	0.010883	500	0.013943	750	0.021926	1000	0.023058		
Toxaphene (peak 4)	50	0.006261	100	0.005759	250	0.005693	500	0.008666	750	0.014355	1000	0.015967		
Toxaphene (peak 5)	50	0.017192	100	0.009094	250	0.005283	500	0.006612	750	0.010552	1000	0.011176		
1-BROMO-2-NITROBENZENE (IS)	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000		

PESTICIDES INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Lab Code: CVO
Case No.: D3392
SAS No.: D3392
Contract #: 182032.SL.BA.2B.01
SDG No.: D3392
Instrument ID: GC-T
Calibration Date(s): 06/03/04
Initial Calibration ID: TOX0603A.M
Calibration Time(s): 20:34 - 23:14

	Toxaphene Calibration	Lab File ID:
Std 1:	LEVEL1 TOX	020B2001.D
Std 2:	LEVEL2 TOX	021B2101.D
Std 3:	LEVEL3 TOX	022B2201.D
Std 4:	LEVEL4 TOX	023B2301.D
Std 5:	LEVEL5 TOX	024B2401.D
Std 6:	LEVEL6 TOX	025B2501.D
Std 7:		

	Chlordane Calibration	Lab File ID:
Std 1:		
Std 2:		
Std 3:		
Std 4:		
Std 5:		
Std 6:		
Std 7:		

GC Column: STX-CLP
Concentration Units: ng/ml

Analyte	Curve Fit	Avg. RRF	% RSD	Mean % RSD	R or COD	Q
Toxaphene (peak 1)	Q	0.031608	14.8		0.99976	
Toxaphene (peak 2)	Q	0.029446	12.7		0.99816	
Toxaphene (peak 3)	Q	0.034147	19.7		0.99819	
Toxaphene (peak 4)	Q	0.034292	22.9		0.99826	
Toxaphene (peak 5)	Q	0.016411	35.5		0.99916	
1-BROMO-2-NITROBENZENE (IS)	AVG RSP	1.000000	0.0			

GC Column: STX-CLP2
Concentration Units: ng/ml

Analyte	Curve Fit	Avg. RRF	% RSD	Mean % RSD	R or COD	Q
Toxaphene (peak 1)	Q	0.020621	31.5		0.99847	
Toxaphene (peak 2)	Q	0.018770	29.5		0.99971	
Toxaphene (peak 3)	Q	0.016797	30.5		0.99968	
Toxaphene (peak 4)	Q	0.009450	48.5		0.99952	
Toxaphene (peak 5)	Q	0.009985	42.0		0.99986	
1-BROMO-2-NITROBENZENE (IS)	AVG RSP	1.000000	0.0			

PESTICIDES INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Instrument ID: GC-T
Initial Calibration ID: CST0603A.M
Contract #: 182032.SL.BA.2B.01
Calibration Date(s): 06/03/04
Calibration Time(s): 15:47 - 18:26

	Toxaphene Calibration	Lab File ID:
Std 1:	LEVEL1 CST	012B1201.D
Std 2:	LEVEL2 CST	013B1301.D
Std 3:	LEVEL3 CST	014B1401.D
Std 4:	LEVEL4 CST	015B1501.D
Std 5:	LEVEL5 CST	016B1601.D
Std 6:	LEVEL6 CST	017B1701.D
Std 7:	LEVEL7 CST	018B1801.D

		Lab File ID:
Std 1:		
Std 2:		
Std 3:		
Std 4:		
Std 5:		
Std 6:		

GC Column: STX-CLP Concentration Units: ng/ml

Analyte	STD 1	RF 1	STD 2	RF 2	STD 3	RF 3	STD 4	RF 4	STD 5	RF 5	STD 6	RF 6	STD 7	RF 7
Oxychlordane	1	1.627022	2	1.432000	5	1.338088	10	1.229171	50	1.049305	100	1.262786	500	1.92002
Trans-nonachlor	1	1.935472	2	1.775314	5	1.025689	10	1.809832	50	1.892504	100	1.279287	500	2.09308
Cis-nonachlor	1	1.631089	2	1.455013	5	1.438451	10	1.300916	50	1.238998	100	1.737050	500	2.22334
1-BROMO-2-NITROBENZENE (IS)	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.00000

GC Column: STX-CLP2 Concentration Units: ng/ml

Analyte	STD 1	RF 1	STD 2	RF 2	STD 3	RF 3	STD 4	RF 4	STD 5	RF 5	STD 6	RF 6	STD 7	RF 7
Oxychlordane	1	0.838348	2	0.766796	5	0.705784	10	0.717163	50	0.681654	100	0.863815	500	1.59E+00
Trans-nonachlor	1	1.015043	2	0.976089	5	0.555308	10	1.116560	50	1.334144	100	0.901377	500	1.69E+00
Cis-nonachlor	1	0.851839	2	0.769124	5	0.754959	10	0.755390	50	0.760364	100	1.100503	500	1.60E+00
1-BROMO-2-NITROBENZENE (IS)	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.000000	100	1.00E+00

PESTICIDES INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Lab Code: CVO
Case No.: D3392
SAS No.: D3392
Contract #: 182032.SI.BA.2B.01
SDG No.: D3392
Instrument ID: GC-T
Calibration Date(s): 06/03/04
Initial Calibration ID: CST0603A.M
Calibration Time(s): 20:34 - 23:14

	Toxaphene Calibration	Lab File ID:
Std 1:	LEVEL1 CST	012B1201.D
Std 2:	LEVEL2 CST	013B1301.D
Std 3:	LEVEL3 CST	014B1401.D
Std 4:	LEVEL4 CST	015B1501.D
Std 5:	LEVEL5 CST	016B1601.D
Std 6:	LEVEL6 CST	017B1701.D
Std 7:	LEVEL7 CST	018B1801.D

	Chlordane Calibration	Lab File ID:
Std 1:		
Std 2:		
Std 3:		
Std 4:		
Std 5:		
Std 6:		
Std 7:		

GC Column: STX-CLP
Concentration Units: ng/ml

Analyte	Curve Fit	Avg. RRF	% RSD	Mean % RSD	R or COD	Q
Oxychlordane	QUAD	1.408342	20.4		0.99998	
Trans-nonachlor	QUAD	1.687312	22.9		0.99993	
Cis-nonachlor	QUAD	1.574979	21.2		0.99983	
1-BROMO-2-NITROBENZENE (IS)	AVG RSP	1.000000	0.0	21.5		

GC Column: STX-CLP2
Concentration Units: ng/ml

Analyte	Curve Fit	Avg. RRF	% RSD	Mean % RSD	R or COD	Q
Oxychlordane	QUAD	0.880577	36.4		0.99998	
Trans-nonachlor	QUAD	1.084402	32.9		0.99995	
Cis-nonachlor	QUAD	0.943981	33.1		0.99987	
1-BROMO-2-NITROBENZENE (IS)	AVG RSP	1.000000	0.0	34.1		

PESTICIDES CALIBRATION VERIFICATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Instrument ID: GC-T Calibration Date(s): 06/03/04
Initial Calibration ID: PST0603A.M Calibration Time(s): 10:28 - 14:11
ICV ID: ICV-0603 CCV #1 ID: ICV2-0603 CCV #2 ID: ICV3-0603

GC Column: STX-CLP Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
a-BHC	100	100	0.2							
g-BHC (Lindane)	100	94.1	-5.9							
b-BHC	100	98.6	-1.4							
d-BHC	100	96.8	-3.2							
Heptachlor	100	114	13.9							
Aldrin	100	98.3	-1.7							
Heptachlor epoxide	100	90.4	-9.6							
g-Chlordane	100	94.8	-5.2							
a-Chlordane	100	94.0	-6.0							
4,4-DDE	100	92.6	-7.4							
Endosulfan I	100	93.1	-6.9							
Dieldrin	100	98.2	-1.8							
Endrin	100	97.7	-2.3							
4,4-DDD	100	100	0.1							
Endosulfan II	100	101	0.7							
4,4-DDT	100	93.2	-6.8							
Endrin aldehyde	100	107	6.8							
Methoxychlor	100	115	14.7							
Endosulfan sulfate	100	98.7	-1.3							
Endrin ketone	100	89.8	-10.2							
Oxychlordane				100	88	-11.6				
t-Nonachlor				100	97	-2.9				
c-Nonachlor				100	105	4.6				
Toxaphene							500	445	-11.0	
Tetrachloro-m-xylene (SS)	50.0	50.1	0.3							
Decachlorobiphenyl (SS)	50.0	46.0	-7.9							

GC Column: STX-CLP2 Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
a-BHC	100	98.1	-1.9							
g-BHC (Lindane)	100	101	0.7							
b-BHC	100	102	1.5							
d-BHC	100	95.6	-4.4							
Heptachlor	100	111	10.7							
Aldrin	100	109	9.0							
Heptachlor epoxide	100	105	4.7							
g-Chlordane	100	102	1.6							
a-Chlordane	100	101	1.4							
4,4-DDE	100	107	6.8							
Endosulfan I	100	108	7.6							
Dieldrin	100	105	4.9							
Endrin	100	97.8	-2.2							
4,4-DDD	100	107	6.5							
Endosulfan II	100	107	7.2							
4,4-DDT	100	101	0.8							
Endrin aldehyde	100	108	7.7							
Methoxychlor	100	111	11.1							
Endosulfan sulfate	100	109	8.7							
Endrin ketone	100	97.4	-2.6							
Oxychlordane				100	98	-2.2				
t-Nonachlor				100	99	-1.5				
c-Nonachlor				100	99	-1.3				
Toxaphene							500	472	-5.6	
Tetrachloro-m-xylene (SS)	50	52.6	5.3							
Decachlorobiphenyl (SS)	50	51.6	3.3							

Comments:

PESTICIDES CALIBRATION VERIFICATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Instrument ID: GC-T Calibration Date(s): 06/03/04

Initial Calibration ID: PST0603A.M Calibration Time(s): 10:28 - 14:11

ICV ID: CV1-0603 CCV #1 ID: CV4-0603 CCV #2 ID: CV7-0603

GC Column: STX-CLP Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
a-BHC	10.0	9.7	-3.3	10.0	9.4	-6.2	10.0	9.9	-0.9	
g-BHC (Lindane)	10.0	9.7	-2.8	10.0	9.5	-5.4	10.0	9.5	-5.1	
b-BHC	10.0	10.2	2.0	10.0	9.4	-6.5	10.0	10.0	-0.3	
d-BHC	10.0	9.6	-4.5	10.0	8.51	-14.9	10.0	8.5	-15.3	*
Heptachlor	10.0	11.3	13.2	10.0	11.4	14.5	10.0	10.7	6.7	
Aldrin	10.0	9.9	-1.4	10.0	9.45	-5.5	10.0	10.3	2.6	
Heptachlor epoxide	10.0	10.2	2.0	10.0	9.38	-6.2	10.0	9.5	-5.0	
g-Chlordane	10.0	9.3	-7.2	10.0	8.70	-13.0	10.0	9.5	-5.4	
a-Chlordane	10.0	10.0	-0.3	10.0	9.37	-6.3	10.0	10.1	0.7	
4,4-DDE	20.0	22.0	10.0	20.0	22.9	14.3	20.0	22.8	13.8	
Endosulfan I	10.0	9.9	-1.1	10.0	9.59	-4.1	10.0	10.6	5.9	
Dieldrin	20.0	21.2	5.9	20.0	20.0	0.1	20.0	21.4	6.8	
Endrin	20.0	22.2	11.2	20.0	22.9	14.5	20.0	22.7	13.6	
4,4-DDD	20.0	21.2	5.9	20.0	21.2	6.1	20.0	20.1	0.6	
Endosulfan II	20.0	20.6	3.2	20.0	19.4	-2.9	20.0	20.4	2.2	
4,4-DDT	20.0	21.7	8.3	20.0	20.8	3.8	20.0	19.4	-3.0	
Endrin aldehyde	20.0	20.1	0.4	20.0	18.7	-6.7	20.0	17.8	-11.0	
Methoxychlor	100	104	4.2	100	112	11.7	100	101	1.0	
Endosulfan sulfate	20.0	20.2	1.1	20.0	18.2	-9.2	20.0	18.7	-6.3	
Endrin ketone	20.0	20.3	1.6	20.0	20.2	0.8	20.0	19.9	-0.5	
Tetrachloro-m-xylene (SS)	10.0	9.8	-2.0	10.0	8.84	-11.6	10.0	11.2	12.4	
Decachlorobiphenyl (SS)	20.0	21.8	9.0	20.0	20.7	3.3	20.0	20.2	1.1	

GC Column: STX-CLP2 Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
a-BHC	10.0	9.0	-9.6	10.0	8.8	-12.0	10.0	8.4	-15.6	*
g-BHC (Lindane)	10.0	9.5	-5.4	10.0	9.3	-7.3	10.0	8.7	-12.9	
b-BHC	10.0	10.3	3.0	10.0	9.6	-4.1	10.0	8.9	-10.8	
d-BHC	10.0	9.0	-10.2	10.0	8.0	-19.5	10.0	7.6	-23.8	*
Heptachlor	10.0	11.6	16.3	10.0	11.2	12.2	10.0	11.0	9.6	*
Aldrin	10.0	9.6	-4.1	10.0	8.7	-12.6	10.0	8.2	-17.5	*
Heptachlor epoxide	10.0	9.8	-2.1	10.0	8.8	-12.0	10.0	8.3	-17.3	*
g-Chlordane	10.0	9.7	-2.8	10.0	8.4	-15.7	10.0	8.6	-14.4	*
a-Chlordane	10.0	9.8	-1.8	10.0	8.4	-16.0	10.0	8.0	-19.6	*
4,4-DDE	20.0	19.8	-1.1	20.0	18.0	-9.9	20.0	18.0	-9.8	
Endosulfan I	10.0	9.7	-2.9	10.0	8.4	-15.6	10.0	8.0	-19.6	*
Dieldrin	20.0	19.7	-1.3	20.0	18.0	-9.8	20.0	18.0	-10.0	
Endrin	20.0	21.5	7.4	20.0	19.9	-0.3	20.0	19.2	-4.2	
4,4-DDD	20.0	19.7	-1.6	20.0	19.4	-2.9	20.0	18.1	-9.3	
Endosulfan II	20.0	19.6	-2.0	20.0	17.6	-11.8	20.0	16.6	-17.2	*
4,4-DDT	20.0	23.2	16.1	20.0	24.2	20.8	20.0	20.1	0.6	*
Endrin aldehyde	20.0	19.1	-4.4	20.0	16.2	-18.8	20.0	15.1	-24.3	*
Methoxychlor	100	122	21.6	100	127	27.2	100	117	17.4	*
Endosulfan sulfate	20.0	20.1	0.4	20.0	17.4	-12.9	20.0	19.8	-1.1	
Endrin ketone	20.0	20.1	0.4	20.0	18.2	-9.2	20.0	17.7	-11.6	
Tetrachloro-m-xylene (SS)	10.0	9.9	-1.3	10.0	9.0	-9.9	10.0	8.9	-10.7	
Decachlorobiphenyl (SS)	20.0	21.3	6.7	20.0	18.0	-9.8	20.0	17.3	-13.3	

Comments:

PESTICIDES CALIBRATION VERIFICATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Instrument ID: GC-T Calibration Date(s): 06/03/04

Initial Calibration ID: CST0603A.M Calibration Time(s): 10:28 - 14:11

ICV ID: CV2-0603 CCV #1 ID: CV5-0603 CCV #2 ID: CV8-0603

GC Column: STX-CLP Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
Oxychlordane	10.0	9.6	-4.0	100	95	-4.9	100	103	2.9	
t-Nonachlor	10.0	9.4	-6.0	100	101	0.9	100	111	11.2	
c-Nonachlor	10.0	9.6	-4.3	100	108	8.4	100	119	18.5	

GC Column: STX-CLP2 Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
Oxychlordane	10.0	11.3	12.6	100	88	-11.9	100	93	-7.4	
t-Nonachlor	10.0	11.0	9.7	100	90	-10.4	100	94	-5.6	
c-Nonachlor	10.0	10.7	7.3	100	90	-9.6	100	96	-3.9	

Comments:

PESTICIDES CALIBRATION VERIFICATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Instrument ID: GC-T Calibration Date(s): 06/03/04

Initial Calibration ID: TOX0603A.M Calibration Time(s): 10:28 - 14:11

ICV ID: CV3-0603 CCV #1 ID: CV6-0603 CCV #2 ID: CV9-0603

GC Column: STX-CLP Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
Toxaphene	500	514	2.8	500	434	-13.1	500	496	-0.8	

GC Column: STX-CLP2 Concentration Units: ng/ml

Analyte	ICV			CCV #1			CCV #2			Q
	Expected	Found	% D	Expected	Found	% D	Expected	Found	% D	
Toxaphene	500	557	11	500	438	-12.4	500	437	-12.5	

Comments:

7B

PESTICIDES DEGRADATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO
Contract #: 182032.SL.BA.2B.01
Lab Code: CVO
Case No.: D3392
SAS No.: D3392
SDG No.: D3392
Instrument ID: GC-T
Calibration Date(s): 06/03/04
Initial Calibration ID: PST0603A.M
Calibration Time(s): 10:28 - 14:11
Degradation Check ID: DDT-0603
Date Analyzed: 06/03/04
Time Analyzed: 09:24

GC Column: STX-CLP

Analyte	Response	% Deg.	QC Limits	Q
Endrin Aldehyde	7726	12.8	≤ 15	
Endrin Ketone	7396			
Endrin	102604			
4,4-DDE	3254	5.6	≤ 15	
4,4-DDD	3716			
4,4-DDT	117915			
Total Breakdown		18.4	≤ 30	

GC Column: STX-CLP2

Analyte	Response	% Deg.	QC Limits	Q
Endrin Aldehyde	7546	7.9	≤ 15	
Endrin Ketone	5860			
Endrin	155925			
4,4-DDE	4112	4.5	≤ 15	
4,4-DDD	4529			
4,4-DDT	183476			
Total Breakdown		12.4	≤ 30	

7B

PESTICIDES DEGRADATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO
Contract #: 182032.SL.BA.2B.01
Lab Code: CVO
Case No.: D3392
SAS No.: D3392
SDG No.: D3392
Instrument ID: GC-T
Calibration Date(s): 06/03/04
Initial Calibration ID: PST0603A.M
Calibration Time(s): 10:28 - 14:11
Degradation Check ID: DDT2-0603
Date Analyzed: 06/04/04
Time Analyzed: 00:49

GC Column: STX-CLP

Analyte	Response	% Deg.	QC Limits	Q
Endrin Aldehyde	8435	8.2	≤ 15	
Endrin Ketone	9543			
Endrin	202259			
4,4-DDE	6808	6.5	≤ 15	
4,4-DDD	8202			
4,4-DDT	214359			
Total Breakdown		14.7	≤ 30	

GC Column: STX-CLP2

Analyte	Response	% Deg.	QC Limits	Q
Endrin Aldehyde	6432	4.0	≤ 15	
Endrin Ketone	5580			
Endrin	289610			
4,4-DDE	6741	4.0	≤ 15	
4,4-DDD	8328			
4,4-DDT	358922			
Total Breakdown		8.0	≤ 30	

PESTICIDES ANALYTICAL SEQUENCE

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

GC Column: STX-CLP / STX-CLP2 Start Date: 06/03/04 End Date: 06/04/04

Instrument ID: GC-T Start Time: 09:24 End Time: 17:28

	Field Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
01	DDT-0603	DDT-0603	C:\HPCHEM\1\DATA\060304T1\002B0102.D	06/03/04	09:24
02	LEVEL1 PEST (06/03)	LEVEL1 PEST	C:\HPCHEM\1\DATA\060304T1\003B0301.D	06/03/04	10:28
03	LEVEL2 PEST (06/03)	LEVEL2 PEST	C:\HPCHEM\1\DATA\060304T1\004B0401.D	06/03/04	11:00
04	LEVEL3 PEST (06/03)	LEVEL3 PEST	C:\HPCHEM\1\DATA\060304T1\005B0501.D	06/03/04	11:32
05	LEVEL4 PEST (06/03)	LEVEL4 PEST	C:\HPCHEM\1\DATA\060304T1\006B0601.D	06/03/04	12:04
06	LEVEL5 PEST (06/03)	LEVEL5 PEST	C:\HPCHEM\1\DATA\060304T1\007B0701.D	06/03/04	12:36
07	LEVEL6 PEST (06/03)	LEVEL6 PEST	C:\HPCHEM\1\DATA\060304T1\008B0801.D	06/03/04	13:08
08	LEVEL7 PEST (06/03)	LEVEL7 PEST	C:\HPCHEM\1\DATA\060304T1\009B0901.D	06/03/04	13:39
09	LEVEL8 PEST (06/03)	LEVEL8 PEST	C:\HPCHEM\1\DATA\060304T1\010B1001.D	06/03/04	14:11
10	ICV-0603	ICV-0603	C:\HPCHEM\1\DATA\060304T1\011B1101.D	06/03/04	14:43
11	LEVEL1 CST	LEVEL1 CST	C:\HPCHEM\1\DATA\060304T1\012B1201.D	06/03/04	15:47
12	LEVEL2 CST	LEVEL2 CST	C:\HPCHEM\1\DATA\060304T1\013B1301.D	06/03/04	16:19
13	LEVEL3 CST	LEVEL3 CST	C:\HPCHEM\1\DATA\060304T1\014B1401.D	06/03/04	16:51
14	LEVEL4 CST	LEVEL4 CST	C:\HPCHEM\1\DATA\060304T1\015B1501.D	06/03/04	17:23
15	LEVEL5 CST	LEVEL5 CST	C:\HPCHEM\1\DATA\060304T1\016B1601.D	06/03/04	17:55
16	LEVEL6 CST	LEVEL6 CST	C:\HPCHEM\1\DATA\060304T1\017B1701.D	06/03/04	18:26
17	LEVEL7 CST	LEVEL7 CST	C:\HPCHEM\1\DATA\060304T1\018B1801.D	06/03/04	18:58
18	ICV2-0603	ICV2-0603	C:\HPCHEM\1\DATA\060304T1\019B1901.D	06/03/04	19:30
19	LEVEL1 TOX	LEVEL1 TOX	C:\HPCHEM\1\DATA\060304T1\020B2001.D	06/03/04	20:34
20	LEVEL2 TOX	LEVEL2 TOX	C:\HPCHEM\1\DATA\060304T1\021B2101.D	06/03/04	21:06
21	LEVEL3 TOX	LEVEL3 TOX	C:\HPCHEM\1\DATA\060304T1\022B2201.D	06/03/04	21:38
22	LEVEL4 TOX	LEVEL4 TOX	C:\HPCHEM\1\DATA\060304T1\023B2301.D	06/03/04	22:10
23	LEVEL5 TOX	LEVEL5 TOX	C:\HPCHEM\1\DATA\060304T1\024B2401.D	06/03/04	22:42
24	LEVEL6 TOX	LEVEL6 TOX	C:\HPCHEM\1\DATA\060304T1\025B2501.D	06/03/04	23:14
25	ICV3-0603	ICV3-0603	C:\HPCHEM\1\DATA\060304T1\026B2601.D	06/03/04	23:46
26	DDT2-0603	DDT2-0603	C:\HPCHEM\1\DATA\060304T1\002B2701.D	06/04/04	00:49
27	CV1-0603	CV1-0603	C:\HPCHEM\1\DATA\060304T1\006B2801.D	06/04/04	01:53
28	CV2-0603	CV2-0603	C:\HPCHEM\1\DATA\060304T1\015B2901.D	06/04/04	02:57
29	CV3-0603	CV3-0603	C:\HPCHEM\1\DATA\060304T1\023B3001.D	06/04/04	04:01
30	SB1-0602	SB1-0602	C:\HPCHEM\1\DATA\060304T1\027B3101.D	06/04/04	05:04
31	BS1S0602	BS1S0602	C:\HPCHEM\1\DATA\060304T1\028B3201.D	06/04/04	05:36
32	BS2S0602	BS2S0602	C:\HPCHEM\1\DATA\060304T1\029B3301.D	06/04/04	06:08

Comments:

8

PESTICIDES ANALYTICAL SEQUENCE

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

GC Column: STX-CLP / STX-CLP2 Start Date: 06/03/04 End Date: 06/04/04

Instrument ID: GC-T Start Time: 09:24 End Time: 17:28

	Field Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
01	IL22BCM0514040	D339201	C:\HPCHEM\1\DATA\060304T1\030B3401.D	06/04/04	06:40
02	CV4-0603	CV4-0603	C:\HPCHEM\1\DATA\060304T1\033B4002.D	06/04/04	11:05
03	CV5-0603	CV5-0603	C:\HPCHEM\1\DATA\060304T1\034B1002.D	06/04/04	12:09
04	CV6-0603	CV6-0603	C:\HPCHEM\1\DATA\060304T1\035B4201.D	06/04/04	12:41
05	IL22BCM0514040 DL	D339201 DL	C:\HPCHEM\1\DATA\060304T1\036B4301.D	06/04/04	13:44
06	CV7-0603	CV7-0603	C:\HPCHEM\1\DATA\060304T1\033B4601.D	06/04/04	15:20
07	CV8-0603	CV8-0603	C:\HPCHEM\1\DATA\060304T1\034B4701.D	06/04/04	16:24
08	CV9-0603	CV9-0603	C:\HPCHEM\1\DATA\060304T1\035B4801.D	06/04/04	17:28

Comments:

10A

PESTICIDES IDENTIFICATION SUMMARY DATA SHEET

Field Sample ID: **BS1S0602**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: WATER Lab Sample ID: **BS1S0602**

Instrument ID: GC-T Date Analyzed: 06/04/04

GC Column 1: STX-CLP ID: 0.25 GC Column 2: STX-CLP2 ID: 0.25

Concentration Units: ug/L

Analyte	Column	RT	RT WINDOW FROM	RT WINDOW TO	Conc.	% D	Q
a-BHC	1	10.809	10.778	10.878	2.48	14.8	
	2	12.611	12.578	12.678	2.16		
g-BHC (Lindane)	1	11.549	11.518	11.618	2.40	4.3	
	2	13.459	13.424	13.524	2.30		
b-BHC	1	11.804	11.776	11.876	2.36	10.8	
	2	13.683	13.648	13.748	2.13		
d-BHC	1	12.193	12.165	12.265	2.44	20.2	
	2	14.345	14.310	14.410	2.03		
Heptachlor	1	12.604	12.571	12.671	3.44	11.3	
	2	14.452	14.417	14.517	3.09		
Aldrin	1	13.247	13.214	13.314	2.54	18.1	
	2	15.163	15.127	15.227	2.15		
Heptachlor epoxide	1	14.507	14.472	14.572	2.41	2.5	
	2	16.417	16.381	16.481	2.47		
g-Chlordane	1	14.767	14.731	14.831	2.45	0.4	
	2	16.881	16.845	16.945	2.44		
a-Chlordane	1	15.003	14.994	15.094	9.68	334	*
	2	17.248	17.213	17.313	2.23		
4,4-DDE	1	15.222	15.189	15.289	2.86	17.7	
	2	17.677	17.642	17.742	2.43		
Endosulfan I	1	15.290	15.253	15.353	2.24	12.5	
	2	17.411	17.376	17.476	2.52		
Dieldrin	1	15.771	15.735	15.835	2.55	4.9	
	2	18.178	18.144	18.244	2.43		
Endrin	1	16.257	16.221	16.321	2.58	6.2	
	2	19.149	19.116	19.216	2.43		
4,4-DDD	1	16.461	16.429	16.529	2.52	28.6	
	2	19.507	19.473	19.573	1.96		
Endosulfan II	1	16.772	16.737	16.837	2.57	4.9	
	2	19.903	19.871	19.971	2.45		
4,4-DDT	1	17.104	17.070	17.170	3.08	8.4	
	2	20.701	20.669	20.769	3.34		
Endrin aldehyde	1	17.824	17.790	17.890	2.85	9.2	
	2	21.137	21.101	21.201	2.61		
Methoxychlor	1	18.450	18.418	18.518	17.9	6.1	
	2	22.621	22.581	22.681	19.0		
Endosulfan sulfate	1	19.112	19.079	19.179	2.51	1.6	
	2	21.925	21.887	21.987	2.47		
Endrin ketone	1	20.064	20.033	20.133	2.79	9.4	
	2	23.146	23.105	23.205	2.55		
Oxychlordane	1	1.310	14.259	14.359	6.30	10.2	
	2	8.810	16.159	16.259	6.94		
t-Nonachlor	1	5.640	14.959	15.059	8.85	27.2	
	2	16.500	17.061	17.161	6.96		
c-Nonachlor	1	4.600	16.309	16.409	7.19	0.0	
	2	15.000	19.375	19.475	7.19		

Comments:

10A

PESTICIDES IDENTIFICATION SUMMARY DATA SHEET

Field Sample ID: **IL22BCM0514040**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: WATER Lab Sample ID: **D339201**

Instrument ID: GC-T Date Analyzed: 06/04/04

GC Column 1: STX-CLP ID: 0.25 GC Column 2: STX-CLP2 ID: 0.25

Concentration Units: ug/L

Analyte	Column	RT	RT WINDOW FROM	RT WINDOW TO	Conc.	% D	Q
a-BHC	1	10.794	10.778	10.878	2.94	64.2	*
	2	12.616	12.578	12.678	1.79		
g-BHC (Lindane)	1	11.602	11.518	11.618	1.26	348	*
	2	13.422	13.424	13.524	5.65		
b-BHC	1	11.817	11.776	11.876	9.65	511	*
	2	13.695	13.648	13.748	1.58		
d-BHC	1	12.222	12.165	12.265	3.15	67.6	*
	2	14.380	14.310	14.410	1.88		
Heptachlor	1	12.637	12.571	12.671	4.25	7.5	
	2	14.517	14.417	14.517	4.57		
Aldrin	1	13.254	13.214	13.314	1.85	174	*
	2	15.167	15.127	15.227	5.07		
Heptachlor epoxide	1	14.486	14.472	14.572	27.4	205	*
	2	16.425	16.381	16.481	8.99		
g-Chlordane	1	14.775	14.731	14.831	8.83	328	*
	2	16.883	16.845	16.945	37.8		
a-Chlordane	1	15.027	14.994	15.094	6.14	13.3	
	2	17.254	17.213	17.313	5.42		
4,4-DDE	1	15.222	15.189	15.289	14.2	106	*
	2	17.686	17.642	17.742	29.3		
Endosulfan I	1	15.322	15.253	15.353	4.11	12.4	
	2	17.452	17.376	17.476	4.62		
Dieldrin	1	15.787	15.735	15.835	12.0	279	*
	2	18.168	18.144	18.244	3.17		
Endrin	1	16.252	16.221	16.321	3.55	604	*
	2	19.171	19.116	19.216	25.0		
4,4-DDD	1	16.458	16.429	16.529	68.9	17.8	
	2	19.520	19.473	19.573	58.5		
Endosulfan II	1	16.747	16.737	16.837	13.1	344	*
	2	19.925	19.871	19.971	2.95		
4,4-DDT	1	17.118	17.070	17.170	63.4	24.6	
	2	20.723	20.669	20.769	79.0		
Endrin aldehyde	1	17.783	17.790	17.890	127	3.1	
	2	21.201	21.101	21.201	131		
Methoxychlor	1	18.478	18.418	18.518	22.2	191	*
	2	22.634	22.581	22.681	64.6		
Endosulfan sulfate	1	19.168	19.079	19.179	5.49	554	*
	2	21.904	21.887	21.987	0.84		
Endrin ketone	1	0.000	20.033	20.133		N/A	
	2	23.104	23.105	23.205			
Oxychlordane	1	14.299	14.259	14.359	1.31	573	*
	2	16.203	16.159	16.259	8.81		
t-Nonachlor	1	15.027	14.959	15.059	5.64	193	*
	2	17.106	17.061	17.161	16.5		
c-Nonachlor	1	16.361	16.309	16.409	4.60	226	*
	2	19.369	19.375	19.475	15.0		

Comments:

10A

PESTICIDES IDENTIFICATION SUMMARY DATA SHEET

Field Sample ID: **IL22BCM0514040 DL**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: WATER Lab Sample ID: **D339201 DL**

Instrument ID: GC-T Date Analyzed: 06/04/04

GC Column 1: STX-CLP ID: 0.25 GC Column 2: STX-CLP2 ID: 0.25

Concentration Units: ug/L

Analyte	Column	RT	RT WINDOW FROM	RT WINDOW TO	Conc.	% D	Q
a-BHC	1	10.804	10.778	10.878	2.86	149	*
	2	12.651	12.578	12.678	7.13		
g-BHC (Lindane)	1	0.000	11.518	11.618		N/A	
	2	13.400	13.424	13.524			
b-BHC	1	11.838	11.776	11.876	17.1	824	*
	2	13.669	13.648	13.748	1.85		
d-BHC	1	12.198	12.165	12.265	7.40	3.2	
	2	14.362	14.310	14.410	7.17		
Heptachlor	1	12.595	12.571	12.671	53.8	978	*
	2	14.490	14.417	14.517	4.99		
Aldrin	1	13.218	13.214	13.314	8.66	89.5	*
	2	15.141	15.127	15.227	4.57		
Heptachlor epoxide	1	14.500	14.472	14.572	34.6	243	*
	2	16.391	16.381	16.481	10.1		
g-Chlordane	1	14.781	14.731	14.831	7.63	393	*
	2	16.850	16.845	16.945	37.6		
a-Chlordane	1	15.029	14.994	15.094	10.1	88.8	*
	2	17.218	17.213	17.313	5.35		
4,4-DDE	1	15.224	15.189	15.289	15.9	55.3	*
	2	17.648	17.642	17.742	24.7		
Endosulfan I	1	15.310	15.253	15.353	5.05	68.1	*
	2	17.422	17.376	17.476	8.49		
Dieldrin	1	15.794	15.735	15.835	16.8	100	*
	2	18.122	18.144	18.244	8.42		
Endrin	1	16.255	16.221	16.321	6.10	207	*
	2	19.123	19.116	19.216	18.7		
4,4-DDD	1	16.462	16.429	16.529	126	143	*
	2	19.469	19.473	19.573	52		
Endosulfan II	1	16.752	16.737	16.837		N/A	
	2	19.872	19.871	19.971			
4,4-DDT	1	17.120	17.070	17.170	107	15.9	
	2	20.667	20.669	20.769	92.3		
Endrin aldehyde	1	17.783	17.790	17.890	221	22.1	
	2	21.157	21.101	21.201	181		
Methoxychlor	1	18.475	18.418	18.518	31.7	180	*
	2	22.597	22.581	22.681	88.7		
Endosulfan sulfate	1	0.000	19.079	19.179		N/A	
	2	21.964	21.887	21.987			
Endrin ketone	1	0.000	20.033	20.133		N/A	
	2	23.180	23.105	23.205			
Oxychlordane	1	14.272	14.259	14.359	11.3	1.8	
	2	16.172	16.159	16.259	11.5		
t-Nonachlor	1	15.029	14.959	15.059	8.55	164	*
	2	17.067	17.061	17.161	22.6		
c-Nonachlor	1	16.381	16.309	16.409	10.2	200	*
	2	19.469	19.375	19.475	30.6		

Comments:

10A

PESTICIDES IDENTIFICATION SUMMARY DATA SHEET

Field Sample ID: **BS2S0602**

Lab Name: CH2M HILL ASL Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **BS2S0602**

Instrument ID: GC-T Date Analyzed: 06/04/04

GC Column 1: STX-CLP ID: 0.25 GC Column 2: STX-CLP2 ID: 0.25

Concentration Units: ug/Kg

ANALYTE	PEAK	RT	RT WINDOW FROM	RT WINDOW TO	CONC.	MEAN CONC.	%D
Toxaphene	1	16.348	16.292	16.352	31.1		
	2	17.038	17.006	17.066	21.3		
Column 1	3	17.592	17.568	17.628	30.7	28.4	
	4	18.793	18.762	18.822	26.3		
	5	20.001	19.970	20.030	32.8		
							1.4
	1	20.216	20.185	20.245	20.3		
	2	21.182	21.128	21.188	36.1		
Column 2	3	22.525	22.495	22.555	40.5	28.8	
	4						
	5	23.362	23.331	23.391	18.3		

Comments:

CH2MHILL
Applied Sciences Group

Tuesday, June 08, 2004

CH2M HILL *Page 1 of 1*
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

MDL Replicate Information

Method:	Extraction Method:	Matrix:	Units	Instrument:
SW8081	SW3550	SOIL	UG/KG	GCT

Comment: 10g to 1ml FV

CAS_NO	PARAMETER	MDL Date	MDL	R1	R2	R3	R4	R5	R6	R7	R8	Mean	Std.Dev.	Spike Lev.
72-54-8	4,4'-DDD	03/30/2004	0.022	0.3509	0.3466	0.3456	0.3357	0.3329	0.3292	0.3415	0.3401	0.34	0.007375	0.2
72-55-9	4,4'-DDE	03/30/2004	0.028	0.4064	0.4046	0.4186	0.3978	0.3922	0.3891	0.402	0.4061	0.40	0.009247	0.2
309-00-2	Aldrin	03/30/2004	0.089	0.4887	0.4913	0.5133	0.4918	0.4684	0.4891	0.4773	0.5642	0.50	0.02969	0.1
5103-71-9	Alpha Chlordane	03/30/2004	0.025	0.08866	0.08581	0.07751	0.07933	0.07332	0.07963	0.09853	0.07657	0.082	0.00818	0.1
50-29-3	Chlorophenothane	03/30/2004	0.044	0.1948	0.2003	0.2298	0.1888	0.1894	0.2167	0.2119	0.2136	0.21	0.01465	0.2
60-57-1	Dieldrin	03/30/2004	0.034	0.2003	0.1814	0.1836	0.1753	0.1687	0.163	0.1845	0.179	0.18	0.01124	0.2
959-98-8	Endosulfan I	03/30/2004	0.020	0.1152	0.1096	0.107	0.1031	0.09856	0.09667	0.1021	0.1129	0.11	0.006668	0.1
33213-65-9	Endosulfan II	03/30/2004	0.18	0.2239	0.2174	0.228	0.2116	0.2252	0.2057	0.2235	0.05293	0.20	0.05931	0.2
1031-07-8	Endosulfan sulfate	03/30/2004	0.029	0.4168	0.415	0.4067	0.4022	0.4032	0.3951	0.4255	0.4061	0.41	0.009678	0.2
72-20-8	Endrin	03/30/2004	0.036	0.1863	0.1778	0.1833	0.1685	0.1604	0.15	0.165	0.1704	0.17	0.01209	0.2
7421-93-4	Endrin aldehyde	03/30/2004	0.091	0.2595	0.2697	0.2671	0.2585	0.1838	0.2681	0.2647	0.2812	0.26	0.03023	0.2
53494-70-5	Endrin ketone	03/30/2004	0.11	0.4358	0.4997	0.4257	0.4563	0.495	0.429	0.4137	0.3977	0.44	0.03692	0.2
5103-74-2	Gamma Chlordane	03/30/2004	0.021	0.1179	0.1109	0.1184	0.1038	0.1001	0.1117	0.1147	0.1023	0.11	0.007116	0.1
76-44-8	Heptachlor	03/30/2004	0.047	0.1181	0.1144	0.12	0.1053	0.1065	0.1463	0.1397	0.1063	0.12	0.01558	0.1
1024-57-3	Heptachlor epoxide	03/30/2004	0.026	0.1247	0.1055	0.1103	0.1044	0.09841	0.09841	0.115	0.1069	0.11	0.008763	0.1
72-43-5	Methoxychlor	03/30/2004	0.16	0.9792	1.12	1.096	1.101	1.067	1.075	1.143	1.139	1.09	0.05251	1
27304-13-8	Oxychlordane	05/28/2004	0.030	0.1044	0.1147	0.1036	0.1263	0.1118	0.1091	0.1168	0.1317	0.12	0.009978	0.1
8001-35-2	Toxaphene	03/30/2004	2.22	3.121	2.424	3.114	3.204	3.401	3.311	5.043	3.393	3.38	0.742	5
319-84-6	alpha-BHC	03/30/2004	0.032	0.2295	0.2013	0.2054	0.202	0.1983	0.1978	0.2002	0.1991	0.20	0.01051	0.1
319-85-7	beta-BHC	03/30/2004	0.030	0.1067	0.1273	0.1209	0.1139	0.09833	0.1235	0.1077	0.1073	0.11	0.009951	0.1
5103-73-1	cis-Nonachlor	05/28/2004	0.023	0.1147	0.1169	0.1154	0.133	0.1204	0.1261	0.11	0.1257	0.12	0.007532	0.1
58-89-9	gamma-BHC (Lindane)	03/30/2004	0.083	0.1089	0.1758	0.1082	0.1294	0.09473	0.1609	0.1433	0.1385	0.13	0.02782	0.1
39765-80-5	trans-Nonachlor	05/28/2004	0.045	0.1626	0.1227	0.1182	0.1433	0.1284	0.1415	0.1289	0.1494	0.14	0.01496	0.1

TOTAL PETROLEUM HYDROCARBONS-DIESEL
BY METHOD TPHNW-Dx

CASE NARRATIVE
TPH DIESEL/OIL BY TPHNW

Analytical Method: NWTPH-Dx Batch No.: D3392

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 182032.SL.BA.2B.01

Base/Command: Portland—BES Source Control Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate Sample(s):
Diesel range matrix spikes were not recoverable due to high oil concentrations in the sample. No oil range matrix spike was included with this batch.

D. Surrogate Recoveries:
All acceptance criteria were met.

E. Laboratory Control Spike(LCS)
Laboratory control spike BS3S0526 was outside of acceptance criteria (50-150%) for the surrogate spike octacosane at 151%.
The relative percent difference between BS2S0526 and its duplicate, BD2S0526, exceeded RPD limits of <20% at 23.0%. Both samples were within analyte recovery acceptance limits.
The relative percent difference between BS3S0526 and its duplicate, BD3S0526, exceeded RPD limits of <20% at 48.6%. Both samples were within analyte recovery acceptance limits.

F. Analytical Exception:
All acceptance criteria were met.

G. Other:
All client and QC sample extracts were cleaned using 10g activated silica gel and 250mm column.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: _____ Date: 06/01/04

Reviewed by: _____ Date: 6/11/04

SAMPLE DATA SUMMARY

1A

ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **IL22BCM0514040**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **D339201**

Sample Amt.: 12.5 g Lab File ID: 010B0701.D

% Moisture: 40.6 Decanted: Y Date Received: 05/17/04

Extraction: Sonc Date Extracted: 05/26/04

Extract Vol.: 1 ml Date Analyzed: 06/07/04

Injection Vol.: 3.0 ul Dilution Factor: 10

GPC Cleanup: N Sulfur Cleanup: N

Concentration Units: mg/Kg

CAS #	Analyte	MDL	PQL	Result	Q
DIESEL_NW	NW TPH Diesel	18.9	135	216	
LUBEOIL_NW	NW TPH Lube Oil	64.6	269	747	

CAS #	Surrogate	% Rec.	QC Limits	Qualifier
84-15-1	O-Terphenyl	82.4	50 - 150	
630-02-4	Octacosane	91.0	50 - 150	

Comments:

Sample does not match diesel fingerprint; diesel range exhibits detection of analyte, however.

1A

ORGANICS ANALYSIS DATA SHEET

Field Sample ID:

IL22BCM0514040 MS

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **D339201MS**

Sample Amt.: 13 g Lab File ID: 011B0801.D

% Moisture: 40.6 Decanted: Y Date Received: 05/17/04

Extraction: Sonc Date Extracted: 05/26/04

Extract Vol.: 1 ml Date Analyzed: 06/07/04

Injection Vol.: 3.0 ul Dilution Factor: 10

GPC Cleanup: N Sulfur Cleanup: N

Concentration Units: mg/Kg

CAS #	Analyte	MDL	PQL	Result	Q
DIESEL_NW	NW TPH Diesel	18.1	130	155	

CAS #	Surrogate	% Rec.	QC Limits	Qualifier
84-15-1	O-Terphenyl	86.9	50 - 150	
630-02-4	Octacosane	92.8	50 - 150	

Comments:

1A

ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **IL22BCM0514040 SD**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **D339201SD**

Sample Amt.: 11.2 g Lab File ID: 012B0901.D

% Moisture: 40.6 Decanted: Y Date Received: 05/17/04

Extraction: Sonc Date Extracted: 05/26/04

Extract Vol.: 1 ml Date Analyzed: 06/07/04

Injection Vol.: 3.0 ul Dilution Factor: 10

GPC Cleanup: N Sulfur Cleanup: N

Concentration Units: mg/Kg

CAS #	Analyte	MDL	PQL	Result	Q
DIESEL_NW	NW TPH Diesel	21.0	150	187	

CAS #	Surrogate	% Rec.	QC Limits	Qualifier
84-15-1	O-Terphenyl	65.4	50 - 150	
630-02-4	Octacosane	73.7	50 - 150	

Comments:

1A

ORGANICS ANALYSIS DATA SHEET

Field Sample ID: **SB2-0526**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: SOIL Lab Sample ID: **SB2-0526**

Sample Amt.: 10 g Lab File ID: 005B0501.D

% Moisture: 0 Decanted: Y Date Received: N/A

Extraction: Sonc Date Extracted: 05/26/04

Extract Vol.: 1 ml Date Analyzed: 06/04/04

Injection Vol.: 3.0 ul Dilution Factor: 1

GPC Cleanup: N Sulfur Cleanup: N

Concentration Units: mg/Kg

CAS #	Analyte	MDL	PQL	Result	Q
DIESEL_NW	NW TPH Diesel	1.40	10.0	10.0	U
LUBEOIL_NW	NW TPH Lube Oil	4.80	20.0	20.0	U

CAS #	Surrogate	% Rec.	QC Limits	Qualifier
84-15-1	O-Terphenyl	94.6	50 - 150	
630-02-4	Octacosane	107	50 - 150	

Comments:

QC SUMMARY

ORGANICS LABORATORY CONTROL SAMPLE SUMMARY

Analytical Method: TPHNW-Dx
Lab Name: CH2M HILL ASL
Concentration Units: mg/Kg
LCS ID: BS2S0526

Matrix: SOIL

SDG No.: D3392
Contract #: 182032.SL.BA.2B.01
% Moisture: 0
LCSD ID: BD2S0526

Analyte	Expected	LCS Found	LCS % Rec.	LCSD Found	LCSD % Rec.	% RPD	QC Limits % Rec.	QC Limits % RPD	Q
NW TPH Diesel	103	108	105	85.8	83.3	23.0	50 - 150	20	*

Comments:

ORGANICS LABORATORY CONTROL SAMPLE SUMMARY

Analytical Method: TPHNW-Dx
Lab Name: CH2M HILL ASL
Concentration Units: mg/Kg
LCS ID: BS3S0526

Matrix: SOIL

SDG No.: D3392
Contract #: 182032.SL.BA.2B.01
% Moisture: 0
LCSD ID: BD3S0526

Analyte	Expected	LCS Found	LCS % Rec.	LCSD Found	LCSD % Rec.	% RPD	QC Limits % Rec.	QC Limits % RPD	Q
NW TPH Lube Oil	50.5	72.9	144	44.3	87.7	48.6	50 - 150	20	*

Comments:

ORGANICS MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE SUMMARY

Analytical Method: TPHNW-Dx
Lab Name: CH2M HILL ASL
Concentration Units: mg/Kg
Parent Field Sample ID: IL22BCM0514040

Matrix: SOIL
MS ID: IL22BCM0514040 MS

SDG No.: D3392
Contract #: 182032.SL.BA.2B.01
% Moisture: 41
MSD ID: IL22BCM0514040 SD

Analyte	Parent Sample Result	MS Spike Added	MS Sample Result	MS % Rec.	MSD Spike Added	MSD Sample Result	MSD % Rec.	% RPD	QC Limits % Rec.	QC Limits % RPD	Q
NW TPH Diesel	216	138	155	-44	154	187	-19	19%	50 - 150	20	*

Comments:
Matrix spike was not recovered due to high concentration of oil range organics in the sample and sample dilution.

ORGANICS METHOD BLANK SUMMARY

Field Sample ID: **SB2-0526**

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Lab File ID: 005B0501.D Lab Sample ID: **SB2-0526**
Matrix: SOIL Extraction: Sonc
Sulfur Cleanup: N Date Extracted: 05/26/04
GPC Cleanup: N Date Analyzed: 06/04/04
GC Column: DB-5 0.25um x 30 m x 0.32mm Time Analyzed: 19:53
Instrument ID: GC-L

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	Field Sample ID	Lab Sample ID	Lab File ID	Date Analyzed
01	BS2S0526	BS2S0526	C:\HPCHEM\2\DATA\060404L1\006B0601.D	06/04/04
02	BD2S0526	BD2S0526	C:\HPCHEM\2\DATA\060404L1\007B0701.D	06/04/04
03	BS3S0526	BS3S0526	C:\HPCHEM\2\DATA\060404L1\008B0801.D	06/04/04
04	BD3S0526	BD3S0526	C:\HPCHEM\2\DATA\060404L1\009B0901.D	06/04/04
05	IL22BCM0514040	D339201	C:\HPCHEM\2\DATA\060704L1\010B0701.D	06/07/04
06	IL22BCM0514040 MS	D339201MS	C:\HPCHEM\2\DATA\060704L1\011B0801.D	06/07/04
07	IL22BCM0514040 SD	D339201SD	C:\HPCHEM\2\DATA\060704L1\012B0901.D	06/07/04
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

Comments:

ORGANICS INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Instrument ID: GC-L
Initial Calibration ID: TPHNW50.M
Contract #: 182032.SL.BA.2B.01
Calibration Date(s): 05/28/04 - 05/29/04
Calibration Time(s): 17:51 -01:06

	Diesel Calibration	Lab File ID:
Std 1:	LEVEL 1 (DIESEL)	003B0301.D
Std 2:	LEVEL 2 (DIESEL)	004B0401.D
Std 3:	LEVEL 3 (DIESEL)	005B0501.D
Std 4:	LEVEL 4 (DIESEL)	006B0601.D
Std 5:	LEVEL 5 (DIESEL)	007B0701.D
Std 6:	LEVEL 6 (DIESEL)	008B0801.D
Std 7:		

Oil Calibration	Lab File ID:
LEVEL 1 (OIL)	011B1101.D
LEVEL 2 (OIL)	012B1201.D
LEVEL 3 (OIL)	013B1301.D
LEVEL 4 (OIL)	014B1401.D
LEVEL 5 (OIL)	015B1501.D
LEVEL 6 (OIL)	016B1601.D
LEVEL 7 (OIL)	017B1701.D

GC Column: DB-5 Concentration Units: ug/ml

Analyte	STD 1	RF 1	STD 2	RF 2	STD 3	RF 3	STD 4	RF 4	STD 5	RF 5	STD 6	RF 6	STD 7	RF 7
NW TPH Diesel	20.1	2.18E-04	50.2	2.58E-04	101	2.11E-04	402	2.18E-04	1005	2.39E-04	2512	2.32E-04		
NW TPH Lube Oil	25.2	2.03E-04	50.5	2.05E-04	101	2.50E-04	202	2.76E-04	505	2.64E-04	1262	2.45E-04	2524	2.80E-04
O-Terphenyl	9.48	1.99E-04	23.71	2.27E-04	47.4	1.76E-04	190	1.77E-04	474	1.91E-04	1186	1.84E-04		
Octacosane	8.61	2.63E-04	21.54	2.94E-04	43.1	2.20E-04	172	2.10E-04	431	2.24E-04	1077	2.06E-04		

ORGANICS INITIAL CALIBRATION

Lab Name: CH2M HILL/LAB/CVO
Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392
Instrument ID: GC-L
Initial Calibration ID: TPHNW50.M

Contract #: 182032.SL.BA.2B.01
Calibration Date(s): 05/28/04 - 05/29/04
Calibration Time(s): 17:51 -01:06

	Diesel Calibration	Lab File ID:
Std 1:	LEVEL 1 (DIESEL)	003B0301.D
Std 2:	LEVEL 2 (DIESEL)	004B0401.D
Std 3:	LEVEL 3 (DIESEL)	005B0501.D
Std 4:	LEVEL 4 (DIESEL)	006B0601.D
Std 5:	LEVEL 5 (DIESEL)	007B0701.D
Std 6:	LEVEL 6 (DIESEL)	008B0801.D
Std 7:		

Oil Calibration	Lab File ID:
LEVEL 1 (OIL)	011B1101.D
LEVEL 2 (OIL)	012B1201.D
LEVEL 3 (OIL)	013B1301.D
LEVEL 4 (OIL)	014B1401.D
LEVEL 5 (OIL)	015B1501.D
LEVEL 6 (OIL)	016B1601.D
LEVEL 7 (OIL)	017B1701.D

GC Column: DB-5 Concentration Units: ug/ml

Analyte	Curve Fit	Avg. RRF	% RSD	Mean % RSD	R or COD	Q
NW TPH Diesel	AVG RSP	2.2934E-04	7.6		1.0000	
NW TPH Lube Oil	AVG RSP	2.4591E-04	12.7		0.9987	
O-Terphenyl	AVG RSP	1.9220E-04	9.9		0.9998	
Octacosane	LINEAR	2.3610E-04	14.8		0.9993	

7A
ANALYSIS DATA SHEET
INITIAL CALIBRATION VERIFICATION

Lab Name: CH2M HILL ASL
Lab Code: CVO
Instrument ID: GC-L
Initial Cal ID: TPHNW50.M
GC Column: DB-5 0.25um x 30 m x 0.32mm

Lab Batch No.: D3392
Init.Calib.Date(s): 05/28/04 - 05/29/04
Init. Calib. Times: 17:51 -01:06
ICV ID: ICV-0603
Concentration Units: mg/L

ANALYTE	Expected mg/L	Found mg/L	Percent Recovery	Q
NW TPH Diesel	1000	935	93.5	
NW TPH Lube Oil	1000	906	90.6	

COMMENTS:
NW TPH Lube Oil reported from ICV2-0528

7A

ORGANICS CALIBRATION VERIFICATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO
Contract #: 182032.SL.BA.2B.01

Lab Code: CVO
Case No.: D3392
SAS No.: D3392
SDG No.: D3392

Instrument ID: GC-L
Calibration Date(s): 05/28/04 - 05/29/04

Initial Calibration ID: TPHNW50.M
Calibration Time(s): 17:51 -01:06

CCV #1 ID: CV1-0604
CCV #2 ID: CV3-0604
CCV #3 ID:

GC Column: DB-5
Concentration Units: mg/L

Analyte	CCV #1				CCV #2				CCV #3			
	Expected	Found	% D	Q	Expected	Found	% D	Q	Expected	Found	% D	Q
NW TPH Diesel	402	434	7.9%		402	431	7.3%					
NW TPH Lube Oil	190	202	6.3%		190	210	10.3%					
O-Terphenyl	172	207	20.2%		172	209	21.4%					
Octacosane	505	469	-7.2%		505	432	-14.4%					

Comments:
LUBE OIL REPORTED FROM CV2-0604 AND CV4-0604

7A

ORGANICS CALIBRATION VERIFICATION SUMMARY

Lab Name: CH2M HILL/LAB/CVO
Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Instrument ID: GC-L
Calibration Date(s): 05/28/04 - 05/29/04

Initial Calibration ID: TPHNW50.M
Calibration Time(s): 17:51 -01:06

CCV #1 ID: CV1-0607 CCV #2 ID: CV4-0607 CCV #3 ID:

GC Column: DB-5
Concentration Units: mg/L

Analyte	CCV #1				CCV #2				CCV #3			
	Expected	Found	% D	Q	Expected	Found	% D	Q	Expected	Found	% D	Q
NW TPH Diesel	402	394	-1.9%		402	348	-13.5%					
NW TPH Lube Oil	190	191	0.7%		190	165	-12.9%					
O-Terphenyl	172	188	9.2%		172	157	-9.0%					
Octacosane	505	514	1.8%		505	466	-7.7%					

Comments:
LUBE OIL REPORTED FROM CV2-0607 AND CV3-0607

8

ORGANICS ANALYTICAL SEQUENCE

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

GC Column: DB-5 0.25um x 30 m x 0.32mm Start Date: 05/28/04 End Date: 05/29/04

Instrument ID: GC-L Start Time: 17:51 End Time: 01:35

	Field Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
01	LEVEL 1 (DIESEL)	LEVEL 1 (DIESEL)	C:\HPCHEM\2\DATA\052804L1\003B0301.D	05/28/04	17:51
02	LEVEL 2 (DIESEL)	LEVEL 2 (DIESEL)	C:\HPCHEM\2\DATA\052804L1\004B0401.D	05/28/04	18:20
03	LEVEL 3 (DIESEL)	LEVEL 3 (DIESEL)	C:\HPCHEM\2\DATA\052804L1\005B0501.D	05/28/04	18:49
04	LEVEL 4 (DIESEL)	LEVEL 4 (DIESEL)	C:\HPCHEM\2\DATA\052804L1\006B0601.D	05/28/04	19:18
05	LEVEL 5 (DIESEL)	LEVEL 5 (DIESEL)	C:\HPCHEM\2\DATA\052804L1\007B0701.D	05/28/04	19:47
06	LEVEL 6 (DIESEL)	LEVEL 6 (DIESEL)	C:\HPCHEM\2\DATA\052804L1\008B0801.D	05/28/04	20:16
07	ICV-0603	ICV-0603	C:\HPCHEM\2\DATA\052804L1\010B1001.D	05/28/04	21:14
08	LEVEL 1 (OIL)	LEVEL 1 (OIL)	C:\HPCHEM\2\DATA\052804L1\011B1101.D	05/28/04	22:12
09	LEVEL 2 (OIL)	LEVEL 2 (OIL)	C:\HPCHEM\2\DATA\052804L1\012B1201.D	05/28/04	22:41
10	LEVEL 3 (OIL)	LEVEL 3 (OIL)	C:\HPCHEM\2\DATA\052804L1\013B1301.D	05/28/04	23:10
11	LEVEL 4 (OIL)	LEVEL 4 (OIL)	C:\HPCHEM\2\DATA\052804L1\014B1401.D	05/28/04	23:39
12	LEVEL 5 (OIL)	LEVEL 5 (OIL)	C:\HPCHEM\2\DATA\052804L1\015B1501.D	05/29/04	00:08
13	LEVEL 6 (OIL)	LEVEL 6 (OIL)	C:\HPCHEM\2\DATA\052804L1\016B1601.D	05/29/04	00:37
14	LEVEL 7 (OIL)	LEVEL 7 (OIL)	C:\HPCHEM\2\DATA\052804L1\017B1701.D	05/29/04	01:06
15	ICV2-0603	ICV2-0603	C:\HPCHEM\2\DATA\052804L1\018B1801.D	05/29/04	01:35
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

Comments:

8

ORGANICS ANALYTICAL SEQUENCE

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

GC Column: DB-5 0.25um x 30 m x 0.32mm Start Date: 06/04/04 End Date: 06/05/04

Instrument ID: GC-L Start Time: 17:58 End Time: 01:39

	Field Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
01	CV1-0604	CV1-0604	C:\HPCHEM\2\DATA\060404L1\003B0301.D	06/04/04	17:58
02	CV2-0604	CV2-0604	C:\HPCHEM\2\DATA\060404L1\004B0401.D	06/04/04	18:56
03	SB2-0526	SB2-0526	C:\HPCHEM\2\DATA\060404L1\005B0501.D	06/04/04	19:53
04	BS2S0526	BS2S0526	C:\HPCHEM\2\DATA\060404L1\006B0601.D	06/04/04	20:22
05	BD2S0526	BD2S0526	C:\HPCHEM\2\DATA\060404L1\007B0701.D	06/04/04	20:51
06	BS3S0526	BS3S0526	C:\HPCHEM\2\DATA\060404L1\008B0801.D	06/04/04	21:20
07	BD3S0526	BD3S0526	C:\HPCHEM\2\DATA\060404L1\009B0901.D	06/04/04	21:49
08	CV3-0604	CV3-0604	C:\HPCHEM\2\DATA\060404L1\013B1401.D	06/05/04	00:42
09	CV4-0604	CV4-0604	C:\HPCHEM\2\DATA\060404L1\014B1501.D	06/05/04	01:39
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

Comments:

ORGANICS ANALYTICAL SEQUENCE

Lab Name: CH2M HILL/LAB/CVO Contract #: 182032.SL.BA.2B.01

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

GC Column: DB-5 0.25um x 30 m x 0.32mm Start Date: 06/07/04 End Date: 06/07/04

Instrument ID: GC-L Start Time: 11:17 End Time: 17:38

	Field Sample ID	Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed
01	CV1-0607	CV1-0607	C:\HPCHEM\2\DATA\060704L1\004B0501.D	06/07/04	11:17
02	CV2-0607	CV2-0607	C:\HPCHEM\2\DATA\060704L1\005B0601.D	06/07/04	12:15
03	IL22BCM0514040	D339201	C:\HPCHEM\2\DATA\060704L1\010B0701.D	06/07/04	13:13
04	IL22BCM0514040 MS	D339201MS	C:\HPCHEM\2\DATA\060704L1\011B0801.D	06/07/04	13:42
05	IL22BCM0514040 SD	D339201SD	C:\HPCHEM\2\DATA\060704L1\012B0901.D	06/07/04	14:11
06	CV3-0607	CV3-0607	C:\HPCHEM\2\DATA\060704L1\014B1202.D	06/07/04	16:35
07	CV4-0607	CV4-0607	C:\HPCHEM\2\DATA\060704L1\013B1301.D	06/07/04	17:38
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

Comments:

CH2MHILL
Applied Sciences Group

Thursday, June 10, 2004

CH2M HILL *Page 1 of 1*
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

MDL Replicate Information

Method:	Extraction Method:	Matrix:	Units	Instrument:
TPHNW-DX	SW3550	SOIL	MG/KG	GCL

Comment:

CAS_NO	PARAMETER	MDL Date	MDL	R1	R2	R3	R4	R5	R6	R7	R8	Mean	Std.Dev.	Spike Lev.
TPH-Diesel	TPH-Diesel	10/03/2003	1.40	4.46	4.84	5.25	5.71	5.7	5.62	5.59	5.65	5.35	0.4682	2.18

CH2MHILL
Applied Sciences Group

Thursday, June 10, 2004

CH2M HILL *Page 1 of 1*
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

MDL Replicate Information

Method:	Extraction Method:	Matrix:	Units	Instrument:
SW8015	SW3550	SOIL	MG/KG	GCL

Comment:

CAS_NO	PARAMETER	MDL Date	MDL	R1	R2	R3	R4	R5	R6	R7	R8	Mean	Std.Dev.	Spike Lev.
TPH-OIL	TPH-OIL	05/28/2004	4.80	8.60530	11.603	7.117	11.304	8.065	9.939	8.886	8.146	9.21	1.60076352	5.05

METALS BY SW6000/7000

CASE NARRATIVE
METALS

Analytical Method: SW6000/7000 SDG#: D3392

Lab Name: CH2M HILL Applied Science Laboratories Project #.: 182032.SL.BA.2B.01

Project Name: Portland—BES Source Control Prime Contractor.:

I. Holding Times:
All holding times were met.

II. Method:
Preparation: SW-846 3051
Analysis: SW-846 6010B, 7041

III. Digestion Exceptions:
None

IV. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. ICP Interference Check Samples:
All acceptance criteria were met.

D. Matrix Spike/Matrix Spike Duplicate Sample(s):
All acceptance criteria were met.

E. Laboratory Control Spike(LCS):
All acceptance criteria were met.

F. Serial Dilution:
All acceptance criteria were met.

G. Other:
None

V. Documentation Exceptions:
None

VI. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Prepared by: Judy Dyer Date: 6-3-04

Reviewed by: Douglas A. Hardy Date: 6/7/04

SAMPLE DATA SUMMARY

1A

INORGANICS ANALYSIS DATA SHEET

Field Sample ID:

IL22BCM0514040

SDG No.: D3392

Matrix: (soil/water) SOIL

Lab Name: CH2M HILL/LAB/CVO

Level: (low/med) LOW

Lab Sample ID: D339201

% Moisture: 41

Date Received: 05/17/04

CONCENTRATION UNITS: mg/Kg

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.13			F
7440-38-2	Arsenic	25.5			P
7440-43-9	Cadmium	2.64			P
7440-47-3	Chromium	83.2			P
7440-50-8	Copper	74.5			P
7439-92-1	Lead	180			P
7439-97-6	Mercury	0.703			CV
7440-66-6	Zinc	529			P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

1A

INORGANICS ANALYSIS DATA SHEET

Field Sample ID: **SB1-0517**

SDG No.: D3392

Matrix: (soil/water) SOIL

Lab Name: CH2M HILL/LAB/CVO

Level: (low/med) LOW

Lab Sample ID: SB1-0517

% Moisture: 0

Date Received: / /

CONCENTRATION UNITS: mg/Kg

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.600	U		F
7440-38-2	Arsenic	2.00	U		P
7440-43-9	Cadmium	1.00	U		P
7440-47-3	Chromium	2.00	U		P
7440-50-8	Copper	1.14	J		P
7439-92-1	Lead	1.20	U		P
7440-66-6	Zinc	3.54	J		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

1A

INORGANICS ANALYSIS DATA SHEET

Field Sample ID: **SB1-0601**

SDG No.: D3392

Matrix:(soil/water) SOIL

Lab Name: CH2M HILL/LAB/CVO

Level: (low/med) LOW

Lab Sample ID: SB1-0601

% Moisture: 0

Date Received: / /

CONCENTRATION UNITS: mg/Kg

CAS No.	Analyte	Concentration	C	Q	M
7439-97-6	Mercury	0.00150	J		CV

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

QC SUMMARY

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Initial Calibration Source: 060104ICP

Concentration Units: ug/L

2nd Source/ICV ID: ICV-0601 CCV #1 ID: CV1-0601 CCV #2 ID: CV2-0601 CCV #3 ID:

Initial Calibration				Continuing Calibration							
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Found	%R(1)	M
Arsenic	1000	967	97	1000	980	98	988	99			P
Cadmium	1000	966	97	1000	970	97	970	97			P
Chromium	1000	979	98	1000	984	98	986	99			P
Copper	1000	930	93	1000	940	94	938	94			P
Lead	1000	979	98	1000	984	98	983	98			P
Zinc	1000	983	98	1000	994	99	995	100			P

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

SW846 Control Limits: Mercury and GFAA 80-120; ICP 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Initial Calibration Source: 060304SB

Concentration Units: ug/L

2nd Source/ICV ID: ICV-0604 CCV #1 ID: CV1-0604 CCV #2 ID: CCV #3 ID:

Initial Calibration				Continuing Calibration							
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Found	%R(1)	M
Antimony	25.0	25.6	102	25.0	26.5	106					F

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

SW846 Control Limits: Mercury and GFAA 80-120; ICP 90-110; Cyanide 85-115

U.S. EPA - CLP

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Initial Calibration Source: 060304HG

Concentration Units: ug/L

2nd Source/ICV ID: ICV-0603 CCV #1 ID: CV1-0603 CCV #2 ID: CCV #3 ID:

Initial Calibration				Continuing Calibration							
Analyte	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	Found	%R(1)	M
Mercury	1.00	1.08	108	1.00	1.07	107					CV

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

SW846 Control Limits: Mercury and GFAA 80-120; ICP 90-110; Cyanide 85-115

US EPA - CLP

3-IN

BLANKS

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Concentration Units: ug/L

ICB ID: ICB-0601 CCB1 ID: CB1-0601 CCB2 ID: CB2-0601 CCB3 ID:

Analyte	Method	Initial Calib. Blank	Continuing Calibration Blank			M
			1	2	3	
Arsenic	SW6010B	10.0U	10.0U	10.0U		P
Cadmium	SW6010B	5.00U	5.00U	5.00U		P
Chromium	SW6010B	10.0U	10.0U	10.0U		P
Copper	SW6010B	2.91J	4.40J	6.48J		P
Lead	SW6010B	6.00U	6.00U	6.00U		P
Zinc	SW6010B	20.0U	1.15J	20.0U		P

Comments:

US EPA - CLP

3-IN

BLANKS

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Concentration Units: ug/L

ICB ID: ICB-0604 CCB1 ID: CB1-0604 CCB2 ID: CCB3 ID:

Analyte	Method	Initial Calib. Blank	Continuing Calibration Blank			M
			1	2	3	
Antimony	SW7041	6.00U	6.00U			F

Comments:

US EPA - CLP

3-IN

BLANKS

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Concentration Units: ug/L

ICB ID: ICB-0603 CCB1 ID: CB1-0603 CCB2 ID: CCB3 ID:

Analyte	Method	Initial Calib. Blank	Continuing Calibration Blank			M
			1	2	3	
Mercury	SW7471A	0.100U	0.100U			CV

Comments:

U.S. EPA - CLP

4

ICP INTERFERENCE CHECK SAMPLE

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

ICP ID Number: OP3000 Initial Calibration Source: 060104ICP

ICS Source: 2-MW-5-1 & 2

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found Sol. AB	Final Found %R
Aluminum	500000	500000	503000	500000	100	532000	514000	103
Arsenic		100		90.1	90		92.8	93
Cadmium		1000		900	90		912	91
Calcium	500000	500000	510000	511000	102	527000	522000	104
Chromium		500		483	97		490	98
Copper		500		477	95		491	98
Iron	200000	200000	174000	174000	87	179000	177000	89
Lead		50		46.9	94		48.4	97
Magnesium	500000	500000	523000	521000	104	533000	526000	105
Zinc		1000		1010	101		1020	102

JG040607-13:01-D3392-M

FORM IV - INORG

US EPA - CLP

7-INORG

LABORATORY CONTROL SAMPLE

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Solid LCS Source: BS1S0517

Aqueous LCS Source:

Analyte	Method	Aqueous (mg/Kg) True	Found	%R	Solid (mg/Kg) True	Found	%R	Limits	C
Arsenic	SW6010B				200	203	102	80-120	
Cadmium	SW6010B				200	197	98.6	80-120	
Chromium	SW6010B				200	197	98.6	80-120	
Copper	SW6010B				200	190	95.2	80-120	
Lead	SW6010B				200	193	96.5	80-120	
Zinc	SW6010B				200	201	101	80-120	

Comments:

US EPA - CLP

7-INORG

LABORATORY CONTROL SAMPLE

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Solid LCS Source: BS1S0517

Aqueous LCS Source:

Analyte	Method	Aqueous (mg/Kg) True	Found	%R	Solid (mg/Kg) True	Found	%R	Limits	C
Antimony	SW7041				4.00	4.16	104	80-120	

Comments:

US EPA - CLP

7-INORG

LABORATORY CONTROL SAMPLE

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Solid LCS Source: BS1S0601

Aqueous LCS Source:

Analyte	Method	Aqueous (mg/Kg) True	Found	%R	Solid (mg/Kg) True	Found	%R	Limits	C
Mercury	SW7471A				3.50	3.56	102	80-120	

Comments:

US EPA - CLP

9-INORG

ICP SERIAL DILUTIONS

EPA SAMPLE NO.

IL22BCM0514040DL

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Matrix: Soil Concentration Units : mg/Kg

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Antimony	1.13		2.57	U			F
Arsenic	25.5		24.2		5.1		P
Cadmium	2.64		1.77		33.0		P
Chromium	83.2		85.0		2.2		P
Copper	74.5		78.1		4.8		P
Lead	180		190		5.6		P
Zinc	529		540		2.1		P

Comments:

10% Criteria does not apply if undiluted sample result is <25 times the MDL for GFAA analyses or <50 times the MDL for ICP.

US EPA - CLP

10-INORG

INSTRUMENT DETECTION LIMITS

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

ICP ID Number: OP3000 Concentration Units : mg/Kg

GFAA ID Number: GFAA

Mercury ID Number: PS200

Analyte	Method	Wavelength (nm)	Background	MDL	RL	M
Arsenic	SW6010B	188	+0.034, -0.012	0.975	2.00	P
Cadmium	SW6010B	226	+0.021, -0.028	0.168	1.00	P
Chromium	SW6010B	267	+0.025, -0.057	0.192	2.00	P
Copper	SW6010B	324	+0.020, -0.049	0.217	2.00	P
Lead	SW6010B	220	+0.013, -0.020	0.309	1.20	P
Zinc	SW6010B	213	+0.038	0.203	4.00	P

Comments:

US EPA - CLP

10-INORG

INSTRUMENT DETECTION LIMITS

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

ICP ID Number: OP3000 Concentration Units : mg/Kg

GFAA ID Number: GFAA

Mercury ID Number: PS200

Analyte	Method	Wavelength (nm)	Background	MDL	RL	M
Antimony	SW7041	218	NA	0.266	0.600	F

Comments:

_____

_____

_____

US EPA - CLP

10-INORG

INSTRUMENT DETECTION LIMITS

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

ICP ID Number: OP3000 Concentration Units : mg/Kg

GFAA ID Number: GFAA

Mercury ID Number: PS200

Analyte	Method	Wavelength (nm)	Background	MDL	RL	M
Mercury	SW7471A	254	NA	0.00069	0.0200	CV

Comments:

US EPA - CLP

11-INORG

ICP INTERELEMENT CORRECTION FACTORS (ANNUALLY)

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

ICP ID Number: OP3000 Date: 11/18/03

Analyte	Method	Wave-length (nm)	Interelement Correction Factors for: Al	Ca	Fe	Mg
Arsenic	SW6010	188	0.01733	0.0397	-0.048	-0.003
Cadmium	SW6010	226	0	0	0.05120	0
Chromium	SW6010	267	0	0	-0.01990	-0.00364
Copper	SW6010	324	0	0.00586	-0.02340	0
Lead	SW6010	220	-0.08270	0	0.01290	0.00720
Zinc	SW6010	213	0	0.0230	0.10530	0

Comments:

US EPA - CLP

12-INORG

ICP LINEAR RANGES (QUARTERLY)

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

ICP ID Number: OP3000 Date: 05/19/04

Analyte	Method	Integ. Time (Sec.)	Concentration (ug/L)	M
Arsenic	SW6010B	Auto	20000	P
Cadmium	SW6010B	Auto	20000	P
Chromium	SW6010B	Auto	20000	P
Copper	SW6010B	Auto	20000	P
Lead	SW6010B	Auto	20000	P
Zinc	SW6010B	Auto	20000	P

Comments:

US EPA - CLP

13-INORG

PREPARATION LOG

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Method Code: P

EPA Sample ID	Preparation Date	Weight (gram)	Volume (mL)
BS1S0517	05/17/04	0.50	100.0
IL22BCM0514040	05/17/04	0.99	100.0
IL22BCM0514040DL	05/17/04	0.99	100.0
SB1-0517	05/17/04	0.50	100.0

Comments:

US EPA - CLP

13-INORG

PREPARATION LOG

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Method Code: F

EPA Sample ID	Preparation Date	Weight (gram)	Volume (mL)
BS1S0517	05/17/04	0.50	100.0
IL22BCM0514040	05/17/04	0.99	100.0
IL22BCM0514040DL	05/17/04	0.99	100.0
SB1-0517	05/17/04	0.50	100.0

Comments:

US EPA - CLP

13-INORG

PREPARATION LOG

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Method Code: CV

EPA Sample ID	Preparation Date	Weight (gram)	Volume (mL)
BS1S0601	06/01/04	0.10	100.0
IL22BCM0514040	06/01/04	1.00	100.0
SB1-0601	06/01/04	0.50	100.0

Comments:

14

ANALYSIS RUN LOG

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Instrument Name: OP3000 Method: SW6010B

	FIELD SAMPLE ID	LAB SAMPLE ID	DF	DATE ANALYZED	TIME ANALYZED
1	CAL BLANK	CAL BLANK	1	06/01/04	1252
2	CAL 1	CAL 1	1	06/01/04	1256
3	CAL 2	CAL 2	1	06/01/04	1259
4	CAL 3	CAL 3	1	06/01/04	1301
5	ICV-0601	ICV-0601	1	06/01/04	1304
6	ICB-0601	ICB-0601	1	06/01/04	1311
7	ICSA	ICSA	1	06/01/04	1317
8	ICSAB	ICSAB	1	06/01/04	1321
9	CV1-0601	CV1-0601	1	06/01/04	1400
10	CB1-0601	CB1-0601	1	06/01/04	1407
11	SB1-0517	SB1-0517	1	06/01/04	1410
12	BS1S0517	BS1S0517	1	06/01/04	1414
13	IL22BCM0514040	D339201	1	06/01/04	1428
14	IL22BCM0514040DL	D339201DL	5	06/01/04	1431
15	CV2-0601	CV2-0601	1	06/01/04	1442
16	CB2-0601	CB2-0601	1	06/01/04	1449
17	ICSA	ICSA	1	06/01/04	1453
18	ICSAB	ICSAB	1	06/01/04	1457

COMMENTS: _____

14

ANALYSIS RUN LOG

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Instrument Name: PS200 Method: SW7471A

	FIELD SAMPLE ID	LAB SAMPLE ID	DF	DATE ANALYZED	TIME ANALYZED
1	Std1	Std1	1	06/03/04	0926
2	Std2	Std2	1	06/03/04	0931
3	Std3	Std3	1	06/03/04	0936
4	Std4	Std4	1	06/03/04	0940
5	Std5	Std5	1	06/03/04	0945
6	Std6	Std6	1	06/03/04	0950
7	ICV-0603	ICV-0603	1	06/03/04	1012
8	ICB-0603	ICB-0603	1	06/03/04	1017
9	SB1-0601	SB1-0601	1	06/03/04	1021
10	BS1S0601	BS1S0601	1	06/03/04	1026
11	IL22BCM0514040	D339201	1	06/03/04	1053
12	CV1-0603	CV1-0603	1	06/03/04	1107
13	CB1-0603	CB1-0603	1	06/03/04	1111

COMMENTS: _____

14

ANALYSIS RUN LOG

Lab Name: CH2M HILL/LAB/CVO Contract: N/A

Lab Code: CVO Case No.: D3392 SAS No.: D3392 SDG No.: D3392

Instrument Name: GFAA Method: SW7041

	FIELD SAMPLE ID	LAB SAMPLE ID	DF	DATE ANALYZED	TIME ANALYZED
1	BLANK	BLANK	1	06/04/04	1215
2	STD3	STD3	1	06/04/04	1231
3	STD4	STD4	1	06/04/04	1237
4	STD5	STD5	1	06/04/04	1243
5	STD2	STD2	1	06/04/04	1306
6	STD1	STD1	1	06/04/04	1333
7	ICV-0604	ICV-0604	1	06/04/04	1343
8	ICB-0604	ICB-0604	1	06/04/04	1349
9	SB1-0517	SB1-0517	1	06/04/04	1354
10	BS1S0517	BS1S0517	1	06/04/04	1400
11	IL22BCM0514040	D339201	1	06/04/04	1423
12	IL22BCM0514040DL	D339201DL	5	06/04/04	1429
13	CV1-0604	CV1-0604	1	06/04/04	1440
14	CB1-0604	CB1-0604	1	06/04/04	1446

COMMENTS: _____

CH2MHILL
Applied Sciences Group

CH2M HILL
Applied Sciences Labortory
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0276

06/04/04

MDL Study Report

Matrix: Soil

Concentration Units: mg/Kg

Analyte	Method	Analysis Date	Amt. Spiked	Replicates								Std. Dev.	MDL	Instrument ID
				1	2	3	4	5	6	7	8			
Antimony	SW7041	11/07/03	2	1.82	1.82	1.83	1.93	1.81	1.90	2.02	2.02	0.0888	0.266	GFAA
Arsenic	SW6010B	10/04/03	3.2	3.12	4.06	3.26	3.80	3.24	3.24	3.52	3.36	0.325	0.975	OP3000
Cadmium	SW6010B	10/04/03	0.6	0.614	0.500	0.584	0.522	0.666	0.572	0.594	0.640	0.0559	0.168	OP3000
Chromium	SW6010B	10/04/03	1.2	1.32	1.32	1.32	1.19	1.21	1.20	1.34	1.23	0.0640	0.192	OP3000
Copper	SW6010B	10/04/03	1.2	1.25	1.36	1.26	1.36	1.44	1.45	1.37	1.34	0.0725	0.217	OP3000
Lead	SW6010B	10/23/03	2	2.02	2.20	2.24	2.28	2.28	2.04	2.12	2.22	0.103	0.309	OP3000
Mercury	SW7471A	11/04/03	0.01	0.00820	0.00770	0.00770	0.00770	0.00740	0.00760	0.00790	0.00780	2.33	0.00069	PS200
Zinc	SW6010B	10/04/03	1.2	1.62	1.70	1.57	1.52	1.61	1.53	1.48	1.57	0.0675	0.203	OP3000

TOTAL ORGANIC CARBON
BY ASTM E777-81

CASE NARRATIVE
TOC SOIL BY ASTM E777

Analytical Method: ASTM E777 Batch No.: D3392

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 182032.SL.BA.2B.01

Base/Command: Portland—BES Source Control Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate Sample(s):
None.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Analytical Exception:
All acceptance criteria were met.

F. Other:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: _____ Date: 6-11-04

Reviewed by: _____ Date: 6-14-04

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

IL22BCM0514040

SDG No.: D3392

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: D339201

Date Received: 05/17/04

CAS NO.	Compound	MDL	PQL	Result	Q	Units	DL	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	512	2230	19200		mg/Kg	1	0.0448 G	ASTM E-777	06/02/04

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0602

SDG No.: D3392

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0602

Date Received: / /

CAS NO.	Compound	MDL	PQL	Result	Q	Units	DL	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	22.9	100	100	U	mg/Kg	1	1 G	ASTM E-777	06/02/04

QC SUMMARY

2A-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: D3392

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E-777

Initial Calibration Date: 06/02/04 1040

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 060204S1

Curve Fit: LNR

Linearity (R2): 0.9991

Compound	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Organic Carbon	100	464149	200	1194929	1000	6116470	4000	2.18E+7	8000	4.15E+7				

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: D3392

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E-777

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 060204S1

Second Source ID: ICV-0602

Compound	Expected	Found	%D	Q
Total Organic Carbon	6430	6580	2.3	

Comments:

2B-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: D3392

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E-777

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 060204S1

Analytical Lot ID: SB1-0602

CCV #1 ID: CV1-0602 CCV #2 ID: CV2-0602 CCV #3 ID:

Compound	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Organic Carbon	4000	4140	3.5		2000	1960	-2.0					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID: SB1-0602

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E-777 Lab Sample ID: SB1-0602

Initial Cal ID: 060204S1 Date Analyzed: 06/02/04

Matrix: (Soil/Water) SOIL Time Analyzed: 1342

Instrument: TOC Skalar

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
04	CV1-0602	CV1-0602	06/02/04	1318
05	BS1S0602	BS1S0602	06/02/04	1333
07	IL22BCM0514040	D339201	06/02/04	1446
17	CV2-0602	CV2-0602	06/02/04	1741

COMMENTS: _____

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: D3392

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E-777

LCS ID: BS1S0602

Initial Cal ID: 060204S1

Date Analyzed: 06/02/04

Matrix: (Soil/Water) SOIL

Time Analyzed: 1333

Instrument: TOC Skalar

Concentration Units: mg/Kg

Analyte	Expected	Found	%R	Control Limits %R	Q
Total Organic Carbon	6430	6970	108.3	80-120	

* Values outside of QC limits

Comments:

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: D3392

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E-777

Lab Code: CVO

Analytical Lot ID: ICB-0602

Instrument: TOC Skalar

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	06/02/04	1040
03	LEVEL2	LEVEL2	06/02/04	1050
04	LEVEL3	LEVEL3	06/02/04	1100
05	LEVEL4	LEVEL4	06/02/04	1110
06	LEVEL5	LEVEL5	06/02/04	1120
07	ICV-0602	ICV-0602	06/02/04	1141

COMMENTS: _____

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: D3392 Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E-777 Lab Code: CVO

Analytical Lot ID: SB1-0602

Instrument: TOC Skalar

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
04	CV1-0602	CV1-0602	06/02/04	1318
05	BS1S0602	BS1S0602	06/02/04	1333
06	SB1-0602	SB1-0602	06/02/04	1342
07	IL22BCM0514040	D339201	06/02/04	1446
17	CV2-0602	CV2-0602	06/02/04	1741

COMMENTS: _____

CH2MHILL
Applied Sciences Group

CH2M HILL
Applied Sciences Labortory
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0276

06/11/04

MDL Study Report

Matrix: Soil

Concentration Units: mg/Kg

Analyte	Method	Analysis Date	Amt. Spiked	Replicates								Std. Dev.	MDL	Instrument ID
				1	2	3	4	5	6	7	8			
Total Organic Carbon	ASTM E-777	07/18/03	80	25.0	33.2	36.7	27.7	29.6	14.0	30.9		7.29	22.9	TOC Skalar

CHAIN OF CUSTODY/SHIPPING DOCUMENTS

CH2MHILL **Applied Sciences Lab**
CHAIN OF CUSTODY RECORD
AND AGREEMENT TO PERFORM SERVICES

CVO 2300 NW Walnut Boulevard
Corvallis, OR 97330-3538
(541) 752-4271 FAX (541) 752-0276

COC # _____

Project # 182032.SC.BA.2B01	**Purchase Order #**
Project Name BES - Source Control	
Company Name CH2M HILL	
Report to: Dave Lacey	**Phone No:** 503.235.5000
Requested Completion Date: STD	**Sample Disposal:** Dispose ☒ Return ☐

THIS AREA FOR LAB USE ONLY
Lab # 03392 Page 1 of 1

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	Matrix Other	CLIENT SAMPLE ID (8 CHARACTERS)	LAB QC	TOTAL # OF CONTAINERS	Metals - 6010B Sb, As, Cd, Cr, Cu, Pb, Hg, Zn	PAHs - 8270 SIM	Pesticides - 8081A	TPH - Dx	TOC - E777-81	Archive			
											Preservative								
5/14/04	1000	X			X			IL22BCM05 14 04 0		6	X	X	X	X	X	3			

EPA Tier QC Level
1 (Screening) 2 3 4

Alternate Description	Lab ID
	1

Relinquished By David Lacey	**Date/Time** 5/14/04 1400	**Received By**	**Date/Time**
Sampled By and Title David Lacey (Please sign and print name)	**Date/Time**	**Relinquished By** (Please sign and print name)	**Date/Time**
Received By (Please sign and print name)	**Date/Time**	**Relinquished By** (Please sign and print name)	**Date/Time**
Received By (Please sign and print name)	**Date/Time**	**Shipped Via** UPS Fed-Ex Other _____	**Shipping #**

Special Instructions: Reporting limits and clean up methods presented in QAPP & Analyte Memo

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client
Rev 2/01 Lab form 340

Batch Number: D3392 Date received: 5/17/04

Client/Project: BES-Source Control

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	YES	NO
Radiological Screening for AFCEE		✓
Were custody seals intact and on the outside of the cooler?	✓	
If yes, Where? Front ✓ Rear ✓ Lt Side ___ Rt Side ___		
Type of packing material: (Ice) Blue Ice Bubble wrap melted		
Was the Chain of Custody inside the cooler?	✓	
Was the Chain of Custody properly filled out?	✓	
Were the sample containers in good condition?	✓	
Containers supplied by ASL?	✓	
Was there ice in the cooler? Enter temp. 15.4 c	✓	
All VOCs free of air bubbles ? NA		

If the answer to any of the questions above is NO, a Sample Receipt Exceptions Report Must be written.

VERIFICATION OF SAMPLE PRESERVATION (verify all preserved samples except HAAs, HANs and CH)

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	TOX pH <2	Other (specify)	N/A (soils/unpres)
1								X
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Raymond Kaufmann 5/17/04

by: Date

Rev 11/03/03 Receipt.doc 4/6

CH2MHILL
Applied Sciences Group

Sample Receipt Exception Report

Sample Batch Number: DB392 **Client/Project** BES - Source Control

	The following exceptions were noted:	Comments (write number of exception description and the impacted sample numbers)
	1. No custody seal as required by project	
	2. No chain-of-custody provided	
	3. Analysis, description, date of collection not provided	
	4. Samples broken or leaking on reciept.	
X	5. Temperature of samples inappropriate for analysis requested	Ice had melted. cooler temp. was 15.4°C upon receipt.
	6. Container inappropriate for analysis requested	
	7. Inadequate sample volume.	
	8. Preservation inappropriate for analysis requested	
	9. Samples received out of holding time for analysis requrested	
	10. Discrepancies between COC form and container labels.	
	11. Other.	

ACTION TAKEN:

Scott Echols/CVO, Project Chemist, requested sample be analyzed for requested parameters

5-17-04

Originator: [signature] Date: 5/17/04

Client was notified on: (Date/Time) Client Contact:

Client Services:

CH2M HILL
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL
Applied Sciences Group

July 21, 2004

Portland—BES Source Control

182032.SL.BA.2B.01

RE: Laboratory Report for Portland—BES Source Control
Applied Sciences Group Reference No. D3392

Dave Lacey/PDX:

On May 17, 2004, CH2M HILL Applied Sciences Group received one sample with a request for analysis of selected parameters. Original data package was submitted on June 17, 2004. Additional results for dibenzo(a,h)anthracene were requested and are summarized below:

Field ID	Lab ID	MDL	PQL	Result	Q	Dilution	Units
IL22BCM0514040	D339201	4.35	8.31	373		2	ug/kg
IL22BCM0514040DL	D339201DL	21.8	41.5	469		10	ug/kg
SB1-0521	SB1-0521	1.31	2.50	0.454	J	1	ug/kg
BS1S0521	BS1S0521	1.31	2.50	107%		1	ug/kg
BD1S0521	BS1S0521	1.31	2.50	113%		1	ug/kg

Note: BS1S0521: Found = 53.5 ug/kg Expected = 50 ug/kg
BD1S0521: Found = 56.5 ug/kg Expected = 50 ug/kg

No unusual difficulties were encountered during the analysis of the samples above. This data package meets standards requested by client and is not intended or implied to meet any other standard. If you should have any questions concerning the data, or if you need additional information, please call Robert Wong at (541) 758-0235, extension 3130.

Sincerely,

Robert Wong
Analytical Manager

Enclosures

cc:
Scott Echols/CVO

ATTACHMENT E
Laboratory Validation Report

Review of Quality Assurance/Quality Control (QA/QC) Data for Basin 22B Inline Solids Composite Sample, May 2004

TO: David Lacey/PDX
Ken Trotman/PDX
Tina Rice/PDX

COPIES: Project File

FROM: Wendi Gale/CVO
Scott Echols/CVO

DATE: August 5, 2004

Summary

The majority of the data have met the QA/QC acceptance criteria outlined for the Basin 22B Inline Solids Sampling. Nonconformances with QA/QC criteria are discussed, identified, and qualified in this report. The following is a brief summary of the overall quality of the sample results.

All semivolatile organic compound by SIM analysis (SVOC-SIM), metals, mercury, and total organic carbon (TOC) results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy.

The majority of pesticide, NWTPH-Diesel, and NWTPH-Lube Oil (NWTPH-Dx) results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy. Nonconformances with the QA/QC criteria were observed as follows:

- Heptachlor, oxychlordane, trans-nonachlor, and cis-nonachlor results for one sediment sample were qualified as estimates and flagged with a "J" for positive results owing to initial calibration percent relative standard deviations (% RSD) greater than 20 percent.
- NWTPH-Diesel and NWTPH-Lube Oil results for one sediment sample were qualified as estimates and flagged with a "J" for positive results owing to laboratory control spike and laboratory control spike duplicate relative percent difference greater than 20 percent.

Introduction

One sediment sample was collected on May 14, 2004. Samples submitted for SVOC-SIM, pesticide, NWTPH-Dx, metals, mercury, and total organic carbon (TOC) analyses were performed by the Applied Sciences Laboratory, located in Corvallis, Oregon.

Data Review Criteria

U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) *National Functional Guidelines for Organic Data Review* (June 2001), *National Functional Guidelines for Inorganic Data Review* (July 2002), and EPA/Army Corps *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations* (April 1995) provided guidelines for data qualification, where applicable. Only summary QA/QC information was reviewed for each analytical parameter.

This QA review focuses on criteria for the following QA/QC parameters and their overall effect on the data:

- Sample custody, handling, and preservation
- Holding time compliance
- Summary initial and continuing calibration data
- Method blanks
- Surrogate spike recovery
- Precision and Accuracy (laboratory control samples, and spike/spike duplicates)

Analytical Methods

All samples were analyzed by and QA/QC criteria were taken from one of the following sources:

- EPA. Test Methods for Evaluating Solid Waste (SW 846), April 1998.
- Oregon Department of Environmental Quality (DEQ). Northwest Total Petroleum Hydrocarbon-Dx Method (NWTPH-Dx) is based on Oregon's DEQ TPH and Washington Department of Ecology WTPH methods.
- American Society for Testing and Materials (ASTM). Standard Test Method for Carbon and Hydrogen in the Analysis Sample of Refuse-Derived Fuel, Reapproved 1992.

Table 1 lists the analytical method used for each parameter and the number and type of samples analyzed.

Table 1
Summary of Analyses

Parameter	Method	No. of Field Samples
SVOC-SIM	EPA 8270-SIM	1 sediment
Pesticide	SW8081A	1 sediment
TPH-Diesel TPH-Lube Oil	NWTPH-Dx	1 sediment
Metals and Mercury	EPA 6010B EPA 7471A	1 sediment
Total Organic Carbon	ASTM E777-81	1 sediment

Qualifiers

The following definitions provide brief explanations of the data qualifiers that may be assigned to results in the data review process.

U - The analyte was analyzed for, but the analyte was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

The laboratory may have assigned additional data qualifiers. Laboratory data qualifiers are defined in each laboratory report.

Sample Custody, Handling, and Preservation

Chain-of-custody (COC) forms and the laboratory sample receiving checklists were reviewed to determine if any sample handling procedures might affect the integrity or the quality of the sample results.

The cooler was received by the laboratory at a temperature of 15.4°C. All sample containers were received intact. The receipt temperature was outside the 4 °± 2°C criteria; however, the composite sample was taken from solids removed from the basin and stored at ambient temperature before sampling. Therefore, no flags were applied to the data based on sample cooler receipt temperature.

SVOC-SIM, NWTPH-Dx, metals, mercury, and TOC samples were extracted or analyzed within their respective EPA-recommended holding time requirements. The pesticide results for sample IL22BCM0514040 exceeded the EPA-recommended 14-day holding time by 7 days. However, sediment samples may be held for up to 1 year if less than or equal to -20°C. Therefore, no flags were applied to the data based on holding time.

GC/MS Tune Criteria

Instrument tuning must be performed at the beginning of each 12-hour instrument sequence, prior to standard and sample analyses. Analysis frequency criteria and ion abundance criteria for each instrument sequence were met.

Initial Calibration

Initial calibration criteria monitor analytical performance and proper compound identification at the start of analysis. Initial calibration data were provided for each instrument used for SVOC-SIM, pesticide, NWTPH-Dx, metals, mercury, and TOC analysis. Relative response factors (RRF) should be greater than 0.05 for SVOC-SIM and pesticides and %RSD should be less than or equal to 30 for SVOC-SIM, and less than or equal to 20 for pesticide, NWTPH-Dx, and NWTPH-Lube Oil. Except for the instances noted below, all target compounds met initial calibration QC acceptance criteria.

- The pesticide initial calibration reported %RSD above 20 percent for heptachlor (20.5%), oxychlordane (20.4%), trans-nonachlor (22.9%), and cis-nonachlor (21.2%). Positive heptachlor, oxychlordane, trans-nonachlor, and cis-nonachlor results for sediment sample IL22BCM0514040 were qualified as estimates and flagged with a "J" as a result of exceeding initial calibration %RSD criteria.

Continuing Calibration

Continuing calibration criteria monitor analytical performance and proper compound identification on a daily or more frequent basis.

Continuing calibration data were provided for each instrument used for SVOC-SIM, pesticide, NWTPH-Dx, metals, mercury, and TOC analysis. A continuing calibration was performed using a mid-calibration range standard after each 12-hour tuning period, therefore meeting continuing calibration frequency criteria. Percent difference (%D) results should be within the QC control limits of ±25% for SVOC-SIM and pesticides, ±20% for mercury by CVAA, ±20% for antimony by GFAA, and ±10% for TOC and ICP metals to meet continuing calibration verification (CCV) QC acceptance criteria. One pesticide compound, methoxychlor (CV4-0603, 27.2%) was outside this range for the confirmation column. All other target compounds met CCV QC acceptance criteria and no flags were applied based on these criteria.

Method Blanks

Method blanks monitor contamination that may be introduced during analysis.

Method blanks were provided for all analyses. Except for the instances noted below, all method blanks were contamination-free, therefore meeting QC acceptance criteria.

- The SVOC-SIM method blank analyzed on June 4, 2004, was reported with detectable concentrations of benzo(a)pyrene (1.27 J μg/kg). Benzo(a)pyrene in the associated sample was reported greater than five times the amount detected in the method blank, therefore sample results were considered unaffected and were not qualified.

- The pesticide method blank analyzed on June 2, 2004, was reported with detectable concentrations of heptachlor epoxide (0.26 μg/kg), endrin aldehyde (0.4 J μg/kg), and methoxychlor (1.92 J μg/kg). Heptachlor epoxide, endrin aldehyde, and methoxychlor in the associated sample were reported greater than five times the amount detected in the method blank. Therefore, sample results were considered unaffected and were not qualified.

- The metals method blank analyzed on May 17, 2004 was reported with detectable concentrations of copper (1.14 J mg/kg) and zinc (3.54 J mg/kg). Copper and zinc in the associated sample were reported greater than five times the amount detected in the method blank, therefore sample results were considered unaffected and were not qualified.

- The mercury method blank analyzed on June 1, 2004, was reported with detectable concentrations of mercury (0.0015 J mg/kg). Mercury in the associated sample was reported greater than five times the amount detected in the method blank. Therefore, sample results were considered unaffected and were not qualified.

Surrogate Spike Recovery

Surrogate compounds are organic compounds which are similar to the analytes of interest in chemical composition, extraction, and chromatography, but are not likely to be found in environmental samples. Every sample and blank analyzed for organic parameters is spiked prior to extraction or analysis with surrogate compounds that are representative of the analysis. All surrogate spike recoveries should be within the laboratory-established control limits to meet QC acceptance criteria.

EPA Method 8270-SIM (SVOC-SIM)

Surrogate recoveries should be within the QC control limits of 35 to 125 percent for 1-methylnaphthalene-d10, fluorathene-d10, and benzo(a)pyrene-d12, and 18 to 137 percent for terphenyl-d14 for sediment samples. All surrogate recoveries were within the specified QC control limits.

EPA Method 8081A (Pesticide)

Surrogate recoveries should be within the QC control limits of 35 to 135 percent for tetrachloro-m-xylene and 25 to 143 percent for decachlorobiphenyl for sediment samples. All surrogate recoveries were within the specified QC control limits.

NWTPH-Dx (NWTPH-Diesel and NWTPH-Lube Oil)

Surrogate recoveries should be within the QC control limits of 50 to 150 percent for o-terphenyl and octacosane for sediment samples. All surrogate recoveries were within the specified QC control limits.

Laboratory Control Samples and Matrix Spike/Matrix Spike Duplicates

Precision and accuracy of laboratory performance are evaluated by the analysis of laboratory control spike (LCS)/laboratory control spike duplicate and matrix spike (MS)/ matrix spike duplicates (MSDs). LCSs and MS/MSDs should be performed at a frequency of five percent or once per analytical batch, whichever is more frequent. LCS and MS/MSD recoveries and relative percent difference (%RPD) results should be within laboratory established control limits to meet precision and accuracy QC acceptance criteria.

LCS and MS/MSD data were provided by the laboratory. Frequency criteria were met for all analytical methods but not all spiked samples were client specific. No client specified MS/MSD were analyzed for metals (ICP and GFAA) and mercury. No laboratory spike duplicates were reported for metals (ICP, GFAA, mercury) or pesticides.

Except for the instances noted below, all LCS and MS/MSD recoveries and %RPD results were within the laboratory established QC control limits for all samples analyzed.

- EPA Method 8270-SIM (SVOC-SIM) – The %RPD for naphthalene (54%), 2-methylnaphthalene (37%), and dibenzofuran (65%) exceeded the 35% target criteria. The associated surrogate spike recoveries were acceptable, and the LCS/LCSD %RPD were acceptable. Therefore, no flags were assigned based on the MS/MSD %RPD.
- EPA Method 8081A (Pesticides) – The percent recovery for methoxychlor in the LCS was 716%. The laboratory case narrative indicates the possibility that methoxychlor was carried over in the

GPC cleanup as it was detected in the method blank as well. No flags were assigned based on the LCS percent recovery.

- NWTPH-Dx (Diesel and Lube Oil)– The %RPD for Diesel (23.0%) and Lube Oil (48.6%) exceeded the 20% target criteria. The positive NWTPH-Diesel and NWTPH-Lube Oil results for sediment sample IL22BCM0514040 were qualified as estimates and flagged with a "J."