Lower Duwamish Waterway Group

Port of Seattle / City of Seattle / King County / The Boeing Company

Lower Duwamish Waterway Remedial Investigation

TECHNICAL MEMORANDUM: 2009/2010 SURFACE SEDIMENT SAMPLING RESULTS FOR DIOXINS AND FURANS AND OTHER CHEMICALS

For Submittal to

The U.S. Environmental Protection Agency
Region 10
Seattle, WA

The Washington State Department of Ecology
Northwest Regional Office
Bellevue, WA

May 21, 2010

Prepared by: Windward environmental LLC

200 West Mercer Street, Suite 401 • Seattle, Washington • 98119

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Acronyms

Acronym	Definition
cPAH	carcinogenic polycyclic aromatic hydrocarbon
dw	dry weight
EPA	US Environmental Protection Agency
HxCDF	hexachlorodibenzofuran
J-qualifier	estimated concentration
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
MS	matrix spike
NAD83	North American Datum of 1983
QAPP	quality assurance project plan
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RPD	relative percent difference
QC	quality control
RL	reporting limit
RM	river mile
TEQ	toxic equivalent
SMS	Sediment Management Standards
SQS	sediment quality standard
U-qualifier	not detected at given concentration

1 Introduction

This technical memorandum presents chemistry results for surface sediment samples collected from 47 locations in the Lower Duwamish Waterway (LDW) in December 2009 and January 2010. The primary objective of the sampling was to supplement the existing dioxin and furan data for the LDW. Data from this study will be used in the feasibility study to help understand the spatial distribution of dioxins and furans in the LDW, to help identify the area of potential concern for remediation, and to help identify an appropriate range of remedial action levels. Sampling was conducted according to the objectives and methods presented in the surface sediment quality assurance project plan (QAPP) (Windward 2005), the surface sediment QAPP addendum (Windward 2009), and the follow-up memorandum (Windward 2010). This technical memorandum consists of a brief summary of the field sampling effort and results from the chemical analyses.

2 Field Sampling Summary and Deviations

In accordance with the QAPP (Windward 2005), the QAPP addendum (Windward 2009), and the follow-up memorandum (Windward 2010), 13 samples were collected from beach play exposure areas, and 34 samples were collected from other locations in the LDW (Table 1; Map 1). Six of the beach play exposure area samples were collected as composite samples using methods described in a follow-up memorandum (Windward 2010) to the QAPP addendum (Windward 2009).[1] The remaining 7 beach samples and 34 samples from other locations were collected as discrete grab samples, as described in the QAPP addendum. All discrete grab samples, except those from two locations (LDW-SS520 and LDW-SS547), were collected on December 15, 16, and 17, 2009. The six composite beach samples and the two remaining discrete grab samples were collected on January 11, 12, and 13, 2010. Field notes, completed sediment collection forms, and chain-of-custody forms are presented in Attachment 2.

[1] The beach composite samples at these six locations (LDW-SS502, LDW-SS503, LDW-SS529, LDW-SS531, LDW-SS533, and LDW-SS544) were composed of eight discrete grab samples collected from each beach area. The compositing of subsamples from each beach area was conducted at Analytical Resources, Inc., following their standard operating procedures, as approved by the US Environmental Protection Agency.

Table 1. Target and actual coordinates for LDW dioxin and furan sediment sampling locations

Sampling Location	Date	Target Location[a]		Actual Location[a]		Distance from Target (m)	Depth Above (+) or Below (-) MLLW (ft)
		(X)	(Y)	(X)	(Y)		
LDW-SS501	12/16/09	1267164	211254	1267109	211237	17.5	-12
LDW-SS502	1/11/10	na	na	na	na	na	nd
LDW-SS503	1/11/10	na	na	na	na	na	nd
LDW-SS504	12/16/09	1266433	210638	1266433	210637	0.4	-50
LDW-SS505	12/16/09	1267046	210623	1266992	210415	65.4	-18
LDW-SS506	12/16/09	1266889	209889	1266882	209888	2.1	-26
LDW-SS507[b]	12/16/09	1266591	209082	1266590	209084	0.6	-34
LDW-SS508	12/15/09	1267244	208449	1267256	208414	11.4	4
LDW-SS509	12/15/09	1265896	208303	1265893	208313	3.2	6
LDW-SS510	12/16/09	1267272	207564	1267267	207571	2.5	-32
LDW-SS511	12/17/09	1268127	206756	1268130	206762	2.0	-28
LDW-SS512	12/16/09	1267204	206499	1267199	206503	1.9	-8
LDW-SS513	12/17/09	1268449	206550	1268462	206566	6.3	-12
LDW-SS514	12/16/09	1266591	206442	1266590	206442	0.2	-4
LDW-SS515	12/16/09	1268108	205990	1268107	205989	0.5	-10
LDW-SS516	12/16/09	1268071	205142	1268068	205140	1.1	-36
LDW-SS517	12/16/09	1268339	204985	1268340	204985	0.4	-14
LDW-SS518	12/16/09	1268422	203897	1268422	203896	0.4	-36
LDW-SS519	12/16/09	1268460	203398	1268501	203409	13.0	-34
LDW-SS520	01/11/10	1269538	203298	1269537	203301	1.1	-12
LDW-SS521	12/16/09	1268839	202847	1268841	202855	2.4	-32
LDW-SS522	12/16/09	1270700	201639	1270703	201644	1.6	-12
LDW-SS523[c]	12/15/09	1269525	201243	1269533	201193	15.4	nd
LDW-SS524	12/17/09	1270256	201060	1270233	201146	27.2	-16
LDW-SS525	12/16/09	1270429	200277	1270444	200303	9.0	-2
LDW-SS526	12/16/09	1270708	199995	1270659	200018	16.7	nd
LDW-SS527[d]	12/17/09	1271355	199940	1271351	199943	1.5	-8
LDW-SS528	12/16/09	1273448	199166	1273475	199278	35.1	-6
LDW-SS529	1/11/10	na	na	na	na	na	na
LDW-SS530	12/15/09	1271937	198674	1271917	198658	7.9	nd
LDW-SS531	1/12/10	na	na	na	na	na	na
LDW-SS532	12/17/09	1273597	197751	1273597	197754	0.9	2
LDW-SS533	1/12/10	na	na	na	na	na	na
LDW-SS534	12/17/09	1273850	197251	1273849	197249	0.8	-18
LDW-SS535	12/17/09	1274623	196836	1274605	196855	8.0	0
LDW-SS536	12/17/09	1274834	196353	1274835	196351	0.7	-16
LDW-SS537	12/17/09	1274924	196015	1274925	196014	0.4	nd
LDW-SS538	12/17/09	1275532	195943	1275536	195947	1.8	-6
LDW-SS539	12/17/09	1275628	195673	1275627	195675	0.8	-18
LDW-SS540	12/17/09	1275568	195398	1275565	195403	1.8	2
LDW-SS541	12/17/09	1275838	195145	1275840	195146	0.8	-14
LDW-SS542	12/17/09	1275927	194186	1275930	194188	1.1	-4

Sampling Location	Date	Target Location[a]		Actual Location[a]		Distance from Target (m)	Depth Above (+) or Below (-) MLLW (ft)
		(X)	(Y)	(X)	(Y)		
LDW-SS543	12/17/09	1276850	191834	1276849	191839	1.4	-4
LDW-SS544	1/12/10	na	na	na	na	na	na
LDW-SS545	12/17/09	1277541	190499	1277543	190498	0.7	-8
LDW-SS546	12/17/09	1278567	190208	1278586	190150	18.7	nd
LDW-SS547	01/11/10	1277573	189993	1277573	190001	2.4	nd

[a] Coordinates reported in NAD83 horizontal datum; X and Y coordinates are in Washington State Plane N (US survey ft).

[b] Field duplicate LDW-SS602-010 was collected at this location.

[c] Field duplicate LDW SS601-010 was collected at this location.

[d] Field duplicate LDW-SS603-010 was collected at this location.

LDW – Lower Duwamish Waterway

na – not applicable (these beach locations represent a composite of eight samples; sampled areas are shown on Map 1)

nd – no data (gap in bathymetry coverage or outside the bathymetry survey area)

NAD83 – North American Datum of 1983

The target depth for collection of all samples was 0-10 cm, with the exception of composite samples collected at three beach locations (LDW-SS503, LDW-SS529, and LDW-SS533), each of which had a target depth of 0-45 cm. The target depth was not reached at some of the subsample locations at these three beach locations because hard sediment substrate was encountered. The average depth for the eight subsamples collected at each of these three beach locations was 43 cm for LDW-SS503 (Beach 1), 41 cm for LDW-SS529 (Beach 6), and 43 cm for LDW-SS533 (Beach 5).

Field duplicate samples were collected and analyzed such that one duplicate analysis was conducted for every 20 analyses for each analyte, with the exception of dioxins and furans, which were not analyzed in field duplicate samples. Instead, results of laboratory duplicate samples were used to provide the measure of precision for dioxin and furan analyses in accordance with the QAPP addendum (Windward 2009).

Field deviations from the QAPP (Windward 2005), QAPP addendum (Windward 2009), and follow-up memorandum (Windward 2010) included modifications to the sampling locations and dates; data quality and sampling objectives were not affected. The field deviations were as follows:

- Nine discrete grab samples were each collected more than 10 m from their target locations. The rationale for the relocation of each of these samples is presented in Table 2, and the target and actual sampling locations are shown on Map 1.

- Many of the randomly selected subsample locations for the beach composite samples could not be sampled at the pre-selected target locations[2] because they were either under water or the substrate was rocky. New subsample locations were randomly selected, as necessary, in the field in coordination with and under the oversight of the US Environmental Protection Agency (EPA), as described in the field notes presented in Attachment 2.
- Two of the discrete grab samples were collected in January 2010 rather than in December 2009. LDW-SS547 was initially sampled in December, but the location was off-target because the target coordinates had been entered incorrectly by the boat captain. Therefore, LDW-SS547 was re-sampled at the target location in January. LDW-SS520 could not be sampled until January because the access agreement with the property owners had not been finalized in December.
- At beach composite location LDW-SS531, one of the subsamples was inadvertently left on the beach during the evening low-tide sampling on January 12, 2010. This subsample location was re-sampled the following morning at low tide.

Table 2. Locations where samples were collected > 10 m from their target coordinates

Sampling Location	Rationale
LDW-SS501	Location was moved 17 m west of the target location after six unsuccessful attempts were made.[a]
LDW-SS505	Location could not be sampled because it was within the Ash Grove Cement barge off-loading area, so the location was moved 65 m south.[a]
LDW-SS508	Location was moved 11 m so sample could be collected between the two outfalls.[a]
LDW-SS519	Sample was collected approximately 12 m from the target location because of a discrepancy in the boat location positioning system.
LDW-SS523	Location was moved 15 m so sample could be collected closer to the outfall.[a]
LDW-SS524	Location was moved 27 m north because a barge was situated at the target location.[b]
LDW-SS526	Location was moved 17 m so the sample could be collected closer to the outfall.[a]
LDW-SS528	Location was moved 35 m toward the head of Slip 4 based on a discussion between LDWG and EPA.
LDW-SS546	Target coordinates were on land, so the sampling location was moved 35 m from the target location to be near the outfall,[b]

[a] Location modifications were made in coordination with EPA oversight at the time of sampling.
[b] EPA was informed of sampling location modification immediately after sampling and had no objections.
EPA – Environmental Protection Agency
LDWG – Lower Duwamish Waterway Group

[2] Locations were determined by dividing the beach area into eight segments and randomly assigning a sampling location within each segment.

3 Chemistry Results

All of the 47 grab and composite surface sediment samples were analyzed for dioxin and furan congeners, grain size, total organic carbon, and percent moisture. In addition, each of the 13 beach samples (both composites and grabs) was also analyzed for arsenic, polychlorinated biphenyls (PCBs) (as Aroclors), and polycyclic aromatic hydrocarbons (PAHs). PAHs were analyzed so that carcinogenic PAH[3] (cPAH) toxic equivalents (TEQs) could be calculated. Dioxin and furan congener data were also used to calculate TEQs.[4] The analytical results for all individual chemicals for each sample, including field duplicates, are presented in Attachment 1 and are available online.[5] Laboratory report forms are presented in Attachment 4.

Dioxin and furan TEQs ranged from 0.341 to 74.5 ng/kg dry weight (dw) in the grab samples and from 1.71 to 8.99 ng/kg dw in the beach composite samples (Table 3 and Map 2). The highest dioxin and furan TEQ was in the grab sample collected from the northern end of Beach 2 (location LDW-SS509), just south of River Mile (RM) 0.5 on the west side of the LDW (Map 2). The highest arsenic, cPAH, and total PCB concentrations (93.8 mg/kg dw, 7,100 µg/kg dw, and 860 µg/kg dw, respectively) were detected in the beach composite sample collected at Beach 6 (location LDW-SS529), which is located near RM 2.8 on the east side of the LDW (Map 3). A total PCB concentration of 860 µg/kg dw was also detected in the grab sample collected from Beach 5 (location LDW-SS530) near RM 2.7 on the west side of the LDW (Map 3). Map 4 shows the dioxin and furan data from the 2009/2010 sampling event, along with historical data from previous sampling events.

Table 3. Summary statistics for human health risk driver chemicals in beach composite and grab surface sediment samples

Chemical	Detection Frequency	Unit	Detected Concentration		
			Minimum	Maximum	Mean
Beach Composite Samples					
Arsenic	6/6	mg/kg dw	4.3	93.8	24
cPAH TEQ	6/6	µg/kg dw	29 J	7,100 J	1,300
Total PCBs[a]	6/6	µg/kg dw	21	860	230

[3] Total cPAHs were calculated as the sum of the products of the seven individual cPAH compounds (benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, benzo(kfluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) and their compound-specific potency equivalency factors from California Environmental Protection Agency (1994). One-half the reporting limit was used for non-detected cPAH compounds when calculating total cPAHs.

[4] Dioxin and furan TEQs were calculated as the sum of the products of individual dioxin and furan congeners and congener-specific toxicity equivalency factors from Van den Berg et al. (2006). One-half the reporting limit was used for non-detected congeners when calculating dioxin and furan TEQs.

[5] Available at http://www.ldwg.org.

Chemical	Detection Frequency	Unit	Detected Concentration		
			Minimum	Maximum	Mean
Dioxin/furan TEQ	6/6	ng/kg dw	1.71 J	8.99 J	4.26
Grab Samples					
Arsenic	8/8	mg/kg dw	3.8	19.1	11
cPAH TEQ	7/8	µg/kg dw	37 J	4,400 J	1,200
Total PCBs[a]	7/8	µg/kg dw	19.6	860	280
Dioxin/furan TEQ	41/41	mg/kg dw	0.341 J	74.5 J	9.66

[a] For PCB Aroclors, the total PCB concentration represents the sum of detected concentrations of nine individual PCB Aroclors for a given sample. For samples in which none of the individual Aroclors were detected, the maximum RL for an individual PCB Aroclor in that sample was used as the concentration.

cPAH – carcinogenic polycyclic aromatic hydrocarbon
dw – dry weight
J – estimated concentration
PCB – polychlorinated biphenyl
RL – reporting limit
TEQ – toxic equivalent

In addition to the analytes discussed above, two samples (beach composite sample LDW-SS502 and grab sample LDW-SS527) were analyzed for the full suite of Washington State Sediment Management Standard (SMS) chemicals at the request of the Washington State Department of Ecology. There were no exceedances of the sediment quality standards (SQS) in the grab sample from location LDW-SS527.[6] All data are presented in Attachment 1.

4 Data Validation Results

Independent third-party data validation was conducted by Laboratory Data Consultants, Inc. (LDC), following EPA guidance (EPA 1995, 2004, 2005, 2008), as described in Section 5.0 of the original QAPP (Windward 2005). There were no laboratory deviations to the methods outlined in the QAPP (Windward 2005), QAPP addendum (Windward 2009), or follow-up memorandum (Windward 2010).

All dioxin and furan data underwent full-level data validation. For all other analytical data, a minimum of 20% of samples or one sample per delivery group underwent full-level data validation. Summary-level validation was performed on the rest of the data using all the quality control (QC) forms submitted in the laboratory data package. All QAPP (Windward 2005) and QAPP addendum (Windward 2009) requirements for data validation were met.

[6] Concentrations of SMS chemicals in composite sample LDW-SS502 were not compared to the SQS because the SMS are applicable to specific grab samples rather than composite samples over general areas.

Based on the information reviewed, the overall data quality was considered acceptable for all uses, as qualified. Issues that resulted in the qualification of data are summarized below. Detailed information regarding every qualified sample is presented in LDC's data validation reports in Attachment 3.

- Two furan concentrations were J-qualified as estimated because of the high relative percent difference (RPD) between the concentration in the sample and that in its laboratory duplicate sample (i.e., 1,2,3,4,7,8-hexachlorodibenzofuran [HxCDF] in sample LDW-SS534-010 and 2,3,4,6,7,8-HxCDF in sample LDW-SS520-010) (see Table A-1-5 in Attachment 1).
- Three samples (LDW-SS502-010-comp, LDW-SS527-010, and LDW-SS603-010 [the field duplicate of LDW-SS527-010]) each had concentrations of 2,4-dinitrophenol, 3,3-dichlorobenzidine, 4-chloroaniline, aniline, hexachlorobenzene, hexachlorocyclopentadiene, and n-nitrosodiphenylamine, which were UJ-qualified because the associated calibration verification or laboratory control sample results were outside of QC limits.
- All detected concentrations of benzo(b)fluoranthene and benzo(k)fluoranthene were J-qualified as estimated because of a lack of resolution between the isomeric peaks. A total peak quantitation was performed, and the average concentration of the single peak was reported for both compounds.
- Fluoranthene in sample LDW-SS601-01 was J-qualified as estimated because the matrix spike (MS) recovery was above QC limits.
- All Aroclor 1268 concentrations were UJ-qualified because of the low response in the associated initial calibration verification samples.
- All antimony concentrations were J- or UJ-qualified because of low MS recovery (13%); the post-digestion spike concentrations were within QC limits.
- All nickel concentrations were J- or UJ-qualified because of high RPD between the concentrations of the sample and its laboratory duplicate sample.

5 References

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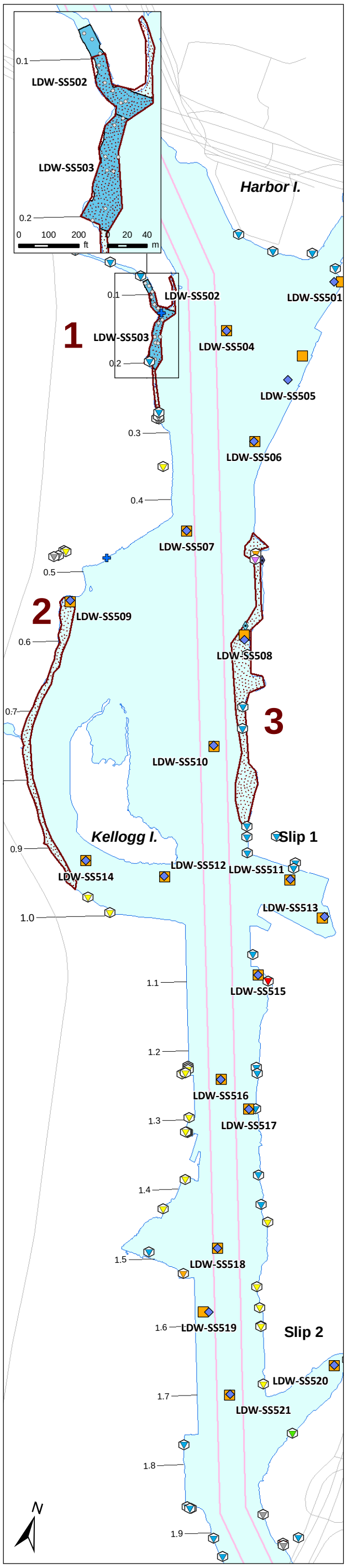
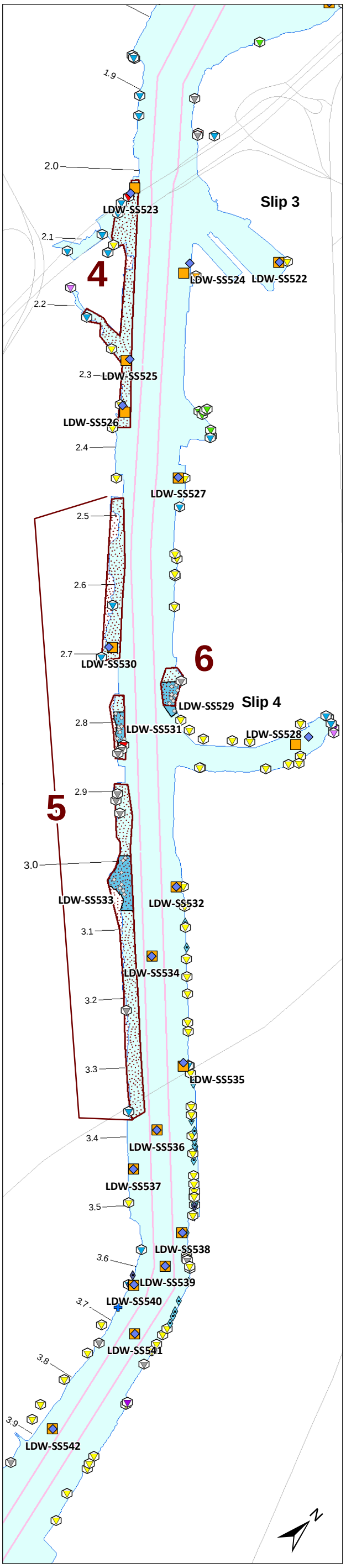
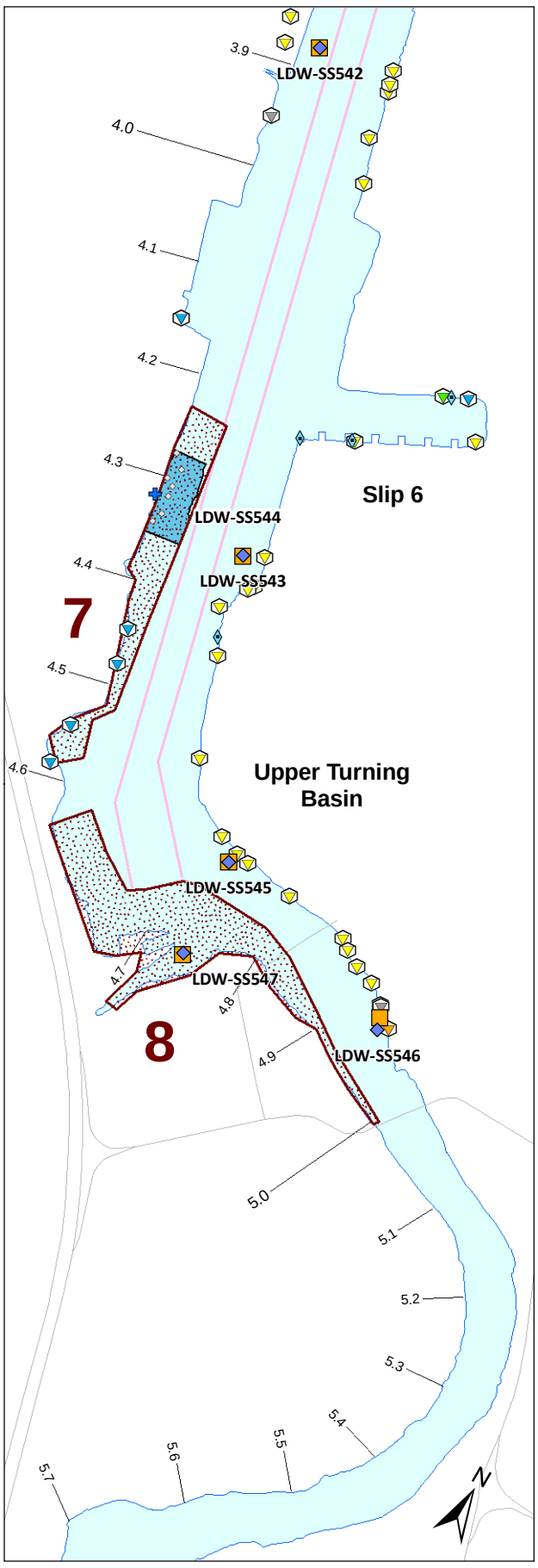
Oversize Maps







- Target surface sediment grab sample location
- Actual surface sediment grab sample location
- Beach sediment composite sample area with subsample locations
- 1 Assumed beach play exposure area

Outfall classification[a]

- CSO
- CSO/storm drain
- EOF
- EOF/storm drain
- Permitted private storm drain
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Abandoned
- Not an outfall
- Stream, channel, or swale
- Road
- River mile
- Navigation channel

[a] Outfalls shown were identified during a City of Seattle low-tide survey in 2003 (Herrera 2004). Some locations were initially identified using drainage maps from Ecology's National Pollutant Discharge Elimination System (NPDES) permit files and other relevant agency databases. These locations were later surveyed in the field. Review of agency files and interviews with agency and Lower Duwamish Waterway Group (LDWG) personnel provided additional outfall-specific information. Some locations were field-verified by LDWG members; some additional outfall locations were identified during these subsequent verifications. The outfall layer is meant to serve as a snapshot of outfall conditions at the time of the survey was completed (2003).

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0 0.1 0.2 Miles

0 0.1 0.2 Kilometers

Scale is the same for each inset map

Map 1. Sampling locations for the 2009/2010 LDW dioxin and furan surface sediment sampling event

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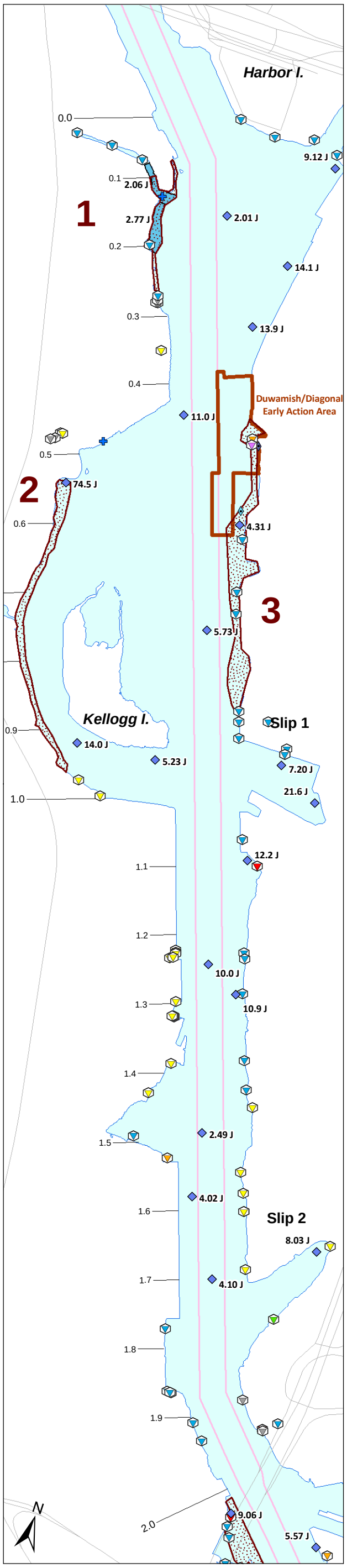
Prepared by CEH, 05/21/2010; MAP #4221; W:\Projects\010-08-06_Duwamish_RI\data\GIS\FS Support\Dioxin and Furan sampling 2009\Data Memo



Dioxin and furan TEQ (ng/kg dw)[a]

- Sediment grab sample location
- Beach sediment composite sample area
- 1 Assumed beach play exposure area
- Early Action Area

Outfall classification[b]

- CSO
- CSO/storm drain
- EOF
- EOF/storm drain
- Permitted private storm drain
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Abandoned
- Not an outfall
- Stream, channel, or swale
- Road
- River mile
- Navigation channel

[a] TEQs were calculated with mammalian TEFs for individual dioxin and furan congeners (Van den Berg et al. 2006), using one-half the reporting limit for undetected congeners. Percentiles were calculated on a numerical basis using all values from the baseline surface sediment, dataset.

[b] Outfalls shown were identified during a City of Seattle low-tide survey in 2003 (Herrera 2004). Some locations were initially identified using drainage maps from Ecology's National Pollutant Discharge Elimination System (NPDES) permit files and other relevant agency databases. These locations were later surveyed in the field. Review of agency files and interviews with agency and Lower Duwamish Waterway Group (LDWG) personnel provided additional outfall-specific information. Some locations were field-verified by LDWG members; some additional outfall locations were identified during these subsequent verifications. The outfall layer is meant to serve as a snapshot of outfall conditions at the time of the survey was completed (2003).

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0 0.1 0.2 Miles

0 0.1 0.2 Kilometers

Scale is the same for each inset map

Map 2. Dioxin and furan TEQ results for the 2009/2010 LDW sediment sampling event

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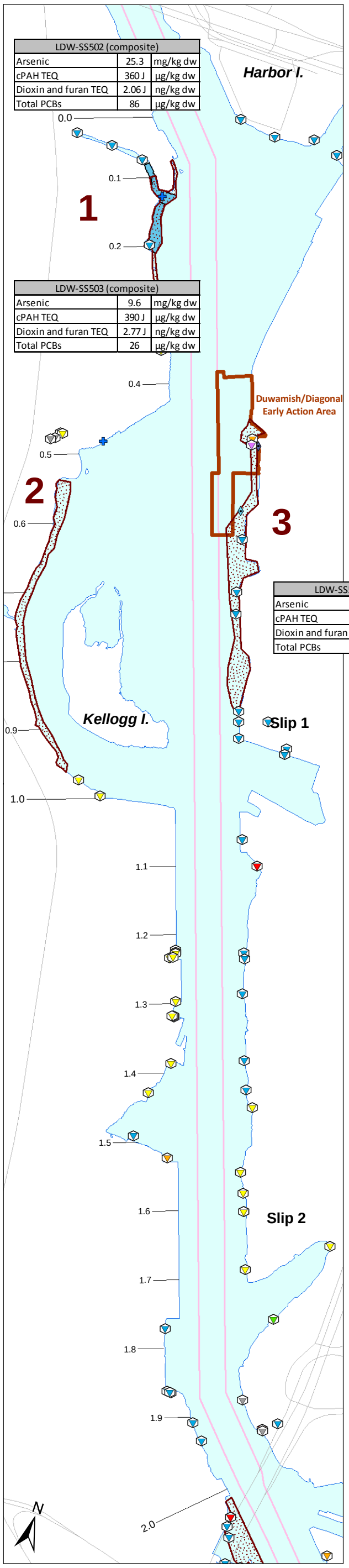
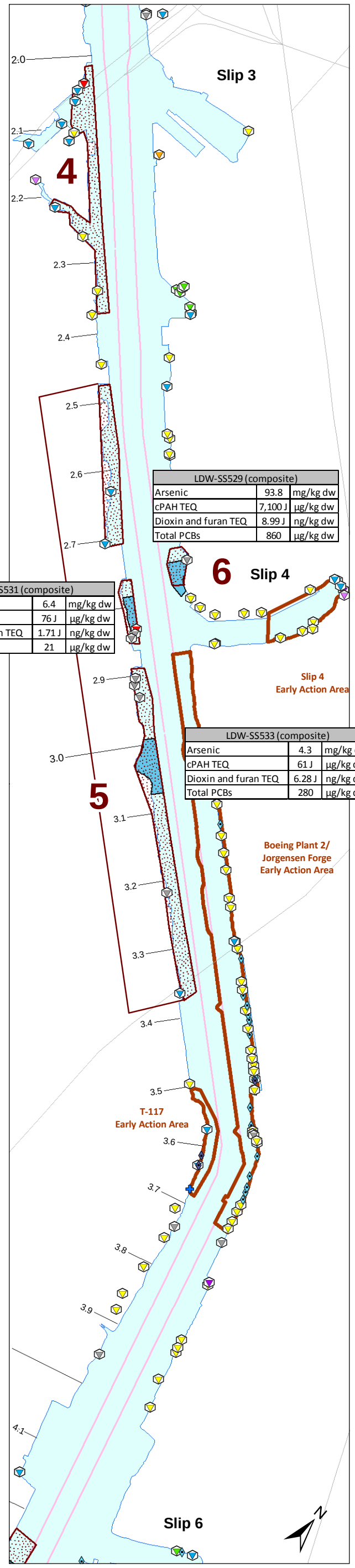
Prepared by CEH, 05/21/2010; MAP #4061; W:\Projects\00-08-06_Duwamish_RI\data\GIS\FS Support\Dioxin and Furan sampling 2009\Data Memo



LDW-SS502 (composite)		
Arsenic	25.3	mg/kg dw
cPAH TEQ	360 J	µg/kg dw
Dioxin and furan TEQ	2.06 J	ng/kg dw
Total PCBs	86	µg/kg dw

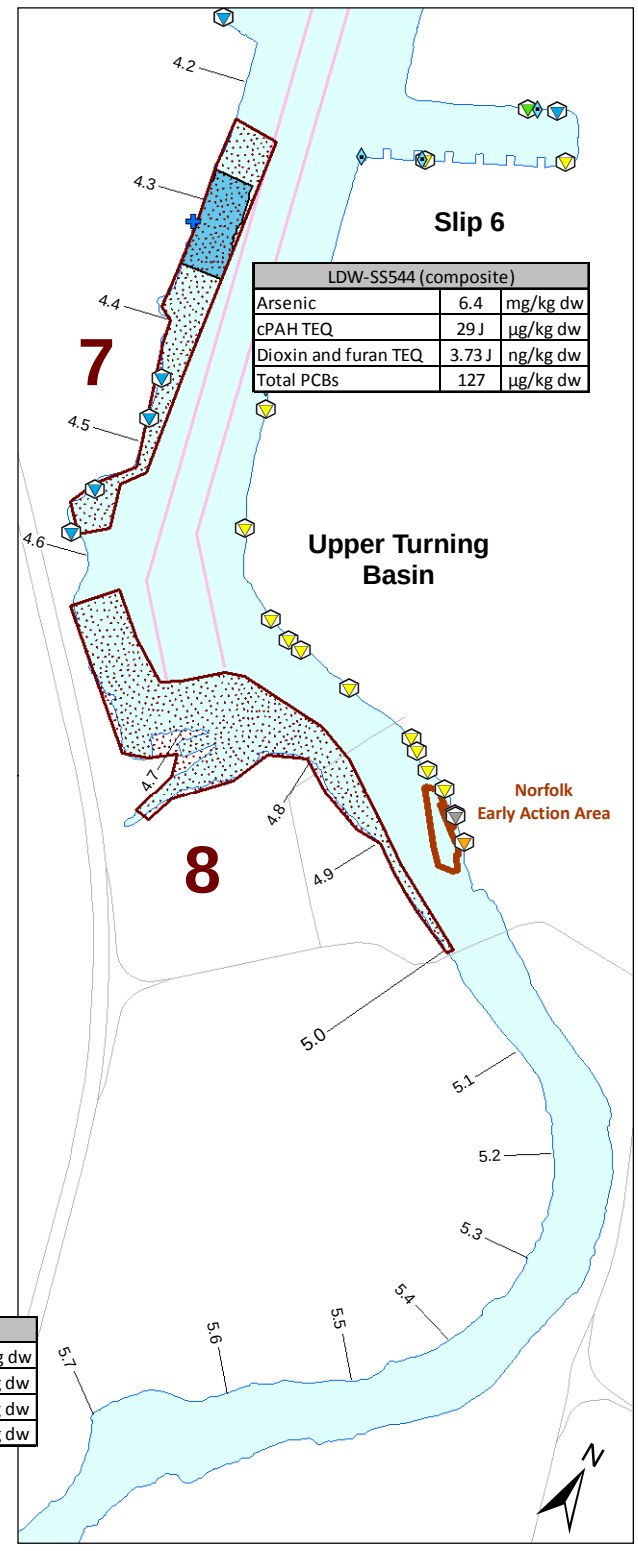
LDW-SS503 (composite)		
Arsenic	9.6	mg/kg dw
cPAH TEQ	390 J	µg/kg dw
Dioxin and furan TEQ	2.77 J	ng/kg dw
Total PCBs	26	µg/kg dw

LDW-SS531 (composite)		
Arsenic	6.4	mg/kg dw
cPAH TEQ	76 J	µg/kg dw
Dioxin and furan TEQ	1.71 J	ng/kg dw
Total PCBs	21	µg/kg dw



LDW-SS529 (composite)		
Arsenic	93.8	mg/kg dw
cPAH TEQ	7,100 J	µg/kg dw
Dioxin and furan TEQ	8.99 J	ng/kg dw
Total PCBs	860	µg/kg dw

LDW-SS533 (composite)		
Arsenic	4.3	mg/kg dw
cPAH TEQ	61 J	µg/kg dw
Dioxin and furan TEQ	6.28 J	ng/kg dw
Total PCBs	280	µg/kg dw



LDW-SS544 (composite)		
Arsenic	6.4	mg/kg dw
cPAH TEQ	29 J	µg/kg dw
Dioxin and furan TEQ	3.73 J	ng/kg dw
Total PCBs	127	µg/kg dw

Beach sediment composite sample area

1 Assumed beach play exposure area

Early Action Area

Outfall classification[a]

- CSO
- CSO/storm drain
- EOF
- EOF/storm drain
- Permitted private storm drain
- Private storm drain
- Public storm drain
- Pipe of unresolved origin and/or use
- Abandoned
- Not an outfall
- Stream, channel, or swale
- Road
- River mile
- Navigation channel

[a] Outfalls shown were identified during a City of Seattle low-tide survey in 2003 (Herrera 2004). Some locations were initially identified using drainage maps from Ecology's National Pollutant Discharge Elimination System (NPDES) permit files and other relevant agency databases. These locations were later surveyed in the field. Review of agency files and interviews with agency and Lower Duwamish Waterway Group (LDWG) personnel provided additional outfall-specific information. Some locations were field-verified by LDWG members; some additional outfall locations were identified during these subsequent verifications. The outfall layer is meant to serve as a snapshot of outfall conditions at the time of the survey was completed (2003).

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0 0.1 0.2 Miles

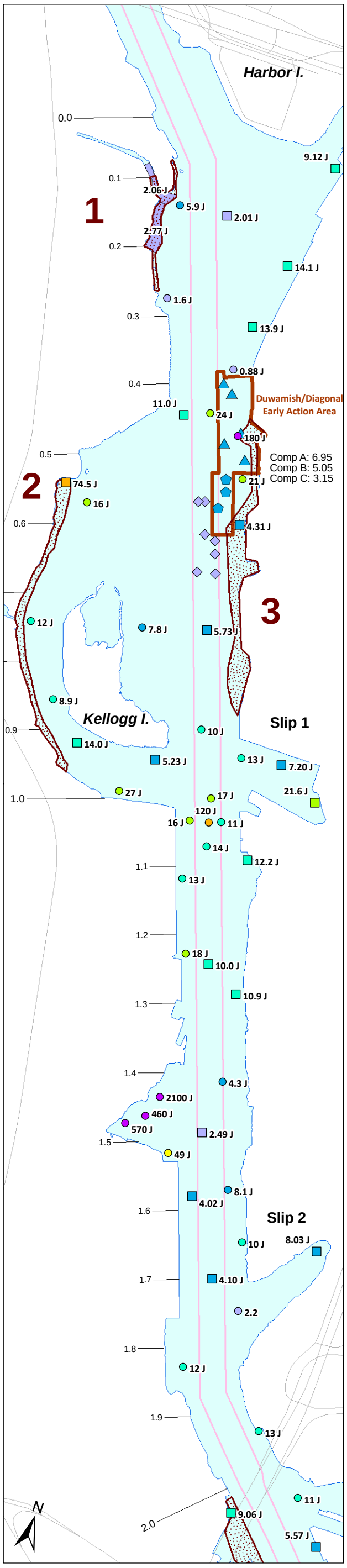
0 0.1 0.2 Kilometers

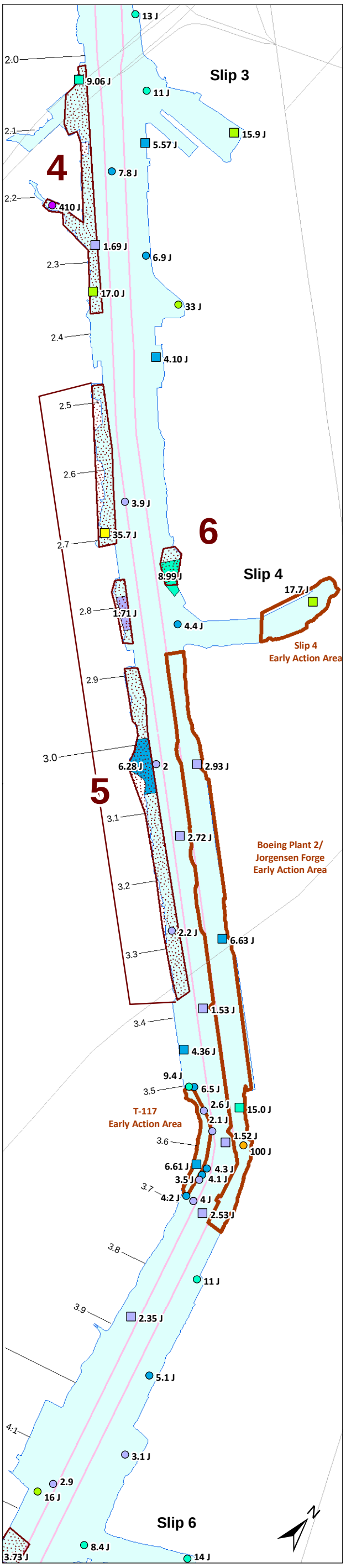
Scale is the same for each inset map

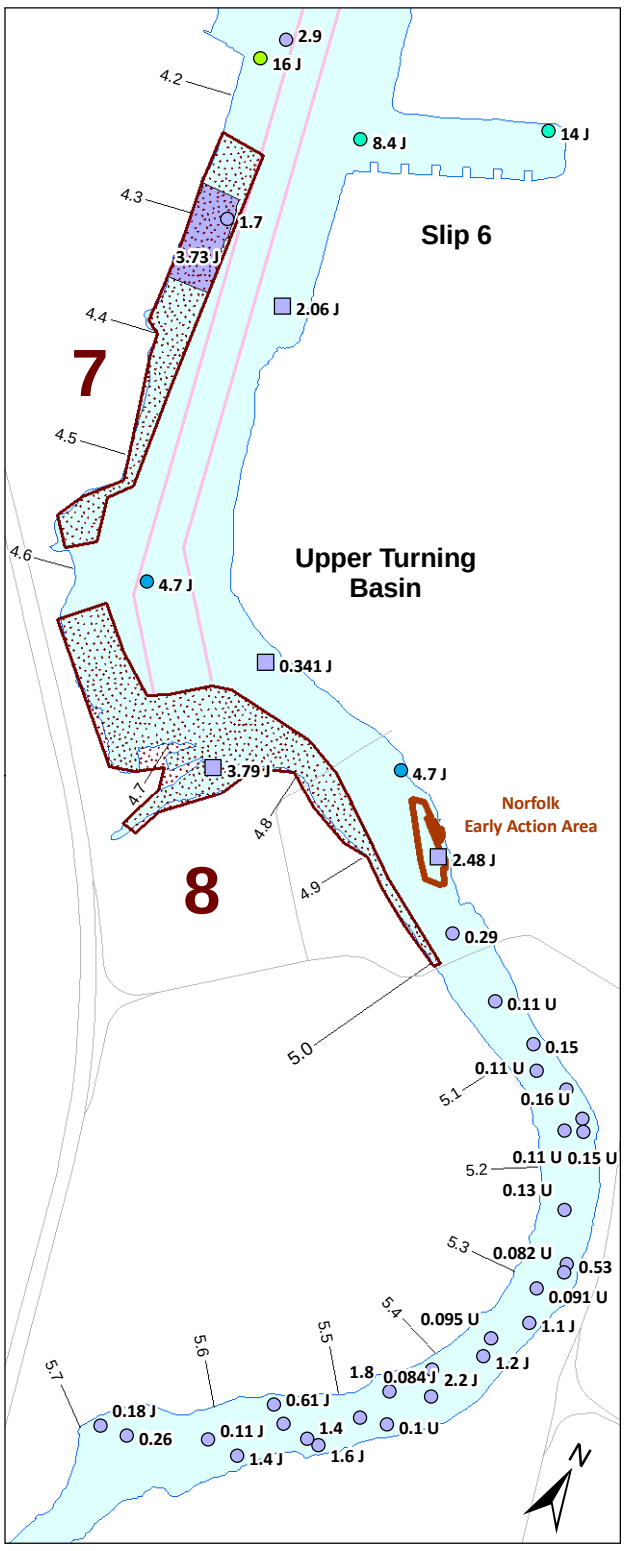
Map 3. Concentrations of human health risk driver chemicals in beach sediment composite samples

DRAFT

Prepared by CEH, 05/21/2010; MAP #4231; W:\Projects\00-08-06_Duwamish_RI\data\GIS\FS Support\Dioxin and Furan sampling 2009\Data Memo







Dioxin and furan TEQ (ng/kg dw)[a]

Baseline RI and other historical surface sediment sampling locations[b]

- > 160
- > 50 and ≤ 160
- > 35 and ≤ 50
- > 15 and ≤ 35
- > 8.1 and ≤ 15
- > 4.0 and ≤ 8.1
- ≤ 4.0

2009/2010 sediment grab sample location

- > 160
- > 50 and ≤ 160
- > 35 and ≤ 50
- > 15 and ≤ 35
- > 8.1 and ≤ 15
- > 4.0 and ≤ 8.1
- ≤ 4.0

King County 2009 composite samples[c]

- DUD-Composite A: L49689-1 > 4.0 and ≤ 8.1
- DUD-Composite B: L49689-2 > 4.0 and ≤ 8.1
- DUD-Composite C: L49689-3 ≤ 4.0

95th percentile = 160
75th percentile = 15
50th percentile = 8.1
25th percentile = 4.0

Beach sediment composite sample area dioxin and furan TEQ (ng/kg dw)[a]

- > 8.1 and ≤ 15
- > 4.0 and ≤ 8.1
- ≤ 4.0

1 Assumed beach play exposure area

Early Action Area

Road

River mile

Navigation channel

[a] TEQs were calculated with mammalian TEFs for individual dioxin and furan congeners (Van den Berg et al. 2006), using one-half the reporting limit for undetected congeners. Percentiles were calculated on a numerical basis using all values from the following datasets: RI baseline; FS baseline; LDW Dioxin Sampling 2009; Ecology Upstream bedded sediment; PSAMP 2008; T115 Berth 1; T117 Sediment Boundary 2009; and King County monitoring April 2009.

[b] The discrete grab sample within the Duwamish/Diagonal Early Action Area (180 J ng/kg dw) was collected prior to the removal action.

[c] Composite samples were collected after the removal action.

Wind Ward environmental LLC

0 0.1 0.2 Miles

0 0.1 0.2 Kilometers

Scale is the same for each inset map

Map 4. Dioxin and furan TEQ results for the 2009/2010 LDW sediment sampling event, including results from historical sampling events

DRAFT

Prepared by CEH, 05/21/2010; MAP #4110; W:\Projects\00-08-06_Duwamish_RI\data\GIS\FS Support\Dioxin and Furan sampling 2009\Data Memo

ATTACHMENT 1

Analytical Results

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS501-010	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS504-010	LDW-SS505-010	LDW-SS506-010
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.398 J	0.122 U	0.279 U	0.150 U	0.535 J	0.608 J
1,2,3,7,8-PeCDD	ng/kg dw	1.55 J	0.491 U	0.518 J	0.277 U	2.16 J	2.14 J
1,2,3,4,7,8-HxCDD	ng/kg dw	2.68 J	0.704 J	0.630 J	0.479 J	3.89 J	4.17 J
1,2,3,6,7,8-HxCDD	ng/kg dw	10.1	2.14	2.31	2.27 J	15.1	14.8
1,2,3,7,8,9-HxCDD	ng/kg dw	7.63	1.80	1.82	1.57 J	11.1	10.8
1,2,3,4,6,7,8-HpCDD	ng/kg dw	248	42.5	42.0	50.9	392	358
OCDD	ng/kg dw	2,360	393	410	497	3,840	3,440
2,3,7,8-TCDF	ng/kg dw	1.27	0.900 U	1.11	0.437 J	2.28	2.06
1,2,3,7,8-PeCDF	ng/kg dw	0.717 J	0.383 J	0.447 J	0.205 J	1.17 J	1.16 J
2,3,4,7,8-PeCDF	ng/kg dw	1.59 J	0.667 J	0.977	0.467 J	2.59 J	2.62 J
1,2,3,4,7,8-HxCDF	ng/kg dw	5.02 J	1.34	2.47	2.43 J	8.71	10.4
1,2,3,6,7,8-HxCDF	ng/kg dw	1.73 J	0.736 J	1.08	0.561 J	2.89 J	3.06 J
1,2,3,7,8,9-HxCDF	ng/kg dw	0.167 J	0.0660 U	1.01 U	0.0670 U	0.230 J	0.200 J
2,3,4,6,7,8-HxCDF	ng/kg dw	1.43 J	0.690 J	0.964 J	0.378 J	2.34 J	2.43 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	40.5	19.4	15.2	14.0	73.6	78.2
1,2,3,4,7,8,9-HpCDF	ng/kg dw	2.79 J	0.752 J	1.06	1.33 J	5.29	5.98
OCDF	ng/kg dw	165	40.9	53.2	63.6	323	320
Total TCDD	ng/kg dw	6.25	4.40	7.17	1.68	8.43	7.58
Total PeCDD	ng/kg dw	12.4	5.38	7.90	2.23	15.2	14.8
Total HxCDD	ng/kg dw	99.4	21.4	20.2	18.9	141	125
Total HpCDD	ng/kg dw	738	110	85.6	136	1,110	945
Total TCDF	ng/kg dw	22.3	10.2	21.6	5.63	33.7	38.4
Total PeCDF	ng/kg dw	26.7	10.8	26.5	7.09	44.7	47.6
Total HxCDF	ng/kg dw	62.6	20.1	29.9	22.3	111	117
Total HpCDF	ng/kg dw	145	48.1	49.5	56.4	279	282
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	9.12 J	2.06 J	2.77 J	2.01 J	14.1 J	13.9 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	34.3	7.9	4.1	1	1.0	0.1 U
Fractional % phi -1-0 (1000-2000 microns)	% dw	1.9	5.1	3.5	2.0	1.2	0.3
Fractional % phi 0-1 (500-1000 microns)	% dw	3.4	18.3	18.1	10.9	2.2	0.6
Fractional % phi 1-2 (250-500 microns)	% dw	12.0	39.7	41.2	27.3	6.7	2.0
Fractional % phi 2-3 (125-250 microns)	% dw	6.4	19.3	16.4	16.1	11.9	10.9
Fractional % phi 3-4 (62.5-125 microns)	% dw	3.0	3.6	4.5	3.6	9.6	13.9

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS501-010	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS504-010	LDW-SS505-010	LDW-SS506-010
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	3.8	1.3	2.5	4.3	9.6	10.2
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	6.3	0.7	2.6	6.3	11.3	11.4
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	7.4	0.5	1.9	7.4	12.8	13.3
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	3.6	0.7	1.4	6.5	10.6	11.4
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	7.8	0.9	1.2	4.2	7.0	7.9
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	4.1	0.8	0.9	3.8	6.1	6.7
Fractional % phi 10+ (<0.98 micron)	% dw	5.9	1.1	1.7	6.4	10.0	11.4
Total gravel	% dw	34.3	7.9	4.1	1	1.0	0.1 U
Total sand	% dw	26.7	86.0	83.7	59.8	31.6	27.7
Total silt	% dw	21.1	3.2	8.4	24.5	44.3	46.3
Total clay	% dw	17.8	2.8	3.8	14.3	23.1	26.0
Total fines (percent silt+clay)	% dw	38.9	6.0	12.2	38.9	67.4	72.3
Conventionals							
Total organic carbon (TOC)	% dw	2.17	2.00	1.29	1.38	1.80	2.12
Total solids	% ww	51.10	73.10 J	76.20 J	68.30	55.30	56.40

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS507-010	LDW-SS602-010 [a]	LDW-SS508-010	LDW-SS509-010	LDW-SS510-010	LDW-SS511-010
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.453 J	na	0.0580 U	5.59	0.324 J	0.386 J
1,2,3,7,8-PeCDD	ng/kg dw	1.44 J	na	4.92 U	15.3	1.04 J	1.09 J
1,2,3,4,7,8-HxCDD	ng/kg dw	2.51 J	na	0.0610 U	13.7	1.61 J	1.92 J
1,2,3,6,7,8-HxCDD	ng/kg dw	10.9	na	0.0810 J	47.7	5.92	7.40
1,2,3,7,8,9-HxCDD	ng/kg dw	7.39	na	0.198 J	41.8	4.64 J	5.81
1,2,3,4,6,7,8-HpCDD	ng/kg dw	315	na	1.48 J	600	141	192
OCDD	ng/kg dw	4,080	na	11.3	5,090	1,380	1,960
2,3,7,8-TCDF	ng/kg dw	1.55	na	1.01 U	55.4	0.801 J	1.00 J
1,2,3,7,8-PeCDF	ng/kg dw	0.944 J	na	4.36 U	28.8	0.472 J	0.550 J
2,3,4,7,8-PeCDF	ng/kg dw	1.96 J	na	4.45 U	54.8	0.994 J	1.30 J
1,2,3,4,7,8-HxCDF	ng/kg dw	8.00	na	4.74 U	39.4	3.56 J	4.79 J
1,2,3,6,7,8-HxCDF	ng/kg dw	2.20 J	na	4.50 U	30.2	1.17 J	1.48 J
1,2,3,7,8,9-HxCDF	ng/kg dw	0.197 J	na	4.97 U	2.35 J	0.106 J	0.108 U
2,3,4,6,7,8-HxCDF	ng/kg dw	1.63 J	na	5.02 U	32.9	0.901 J	1.24 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	58.4	na	0.203 J	219	29.6	35.9
1,2,3,4,7,8,9-HpCDF	ng/kg dw	4.56 J	na	4.74 U	11.5	2.27 J	2.63 J
OCDF	ng/kg dw	285	na	0.673 J	385	149	168
Total TCDD	ng/kg dw	5.93	na	0.207	205	4.03	4.90
Total PeCDD	ng/kg dw	11.2	na	0.0990	232	7.47	7.80
Total HxCDD	ng/kg dw	104	na	1.44	511	56.8	73.1
Total HpCDD	ng/kg dw	1,080	na	3.59	1,910	410	594
Total TCDF	ng/kg dw	23.9	na	0.296	1,090	13.7	18.4
Total PeCDF	ng/kg dw	32.5	na	0.0700	716	17.7	21.6
Total HxCDF	ng/kg dw	95.6	na	0.217	566	46.0	59.7
Total HpCDF	ng/kg dw	242	na	0.527	594	122	133
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	11.0 J	na	4.31 J	74.5 J	5.73 J	7.20 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	0.4	0.1	1.1	7.3	0.1	0.1
Fractional % phi -1-0 (1000-2000 microns)	% dw	0.6	2.5	7.2	3.6	0.7	0.1
Fractional % phi 0-1 (500-1000 microns)	% dw	1.1	2.2	2.1	8.5	1.1	0.2
Fractional % phi 1-2 (250-500 microns)	% dw	1.5	2.8	2.0	19.3	1.7	0.3
Fractional % phi 2-3 (125-250 microns)	% dw	3.2	3.8	2.1	12.4	2.4	0.3
Fractional % phi 3-4 (62.5-125 microns)	% dw	6.1	6.4	1.3	10.6	8.0	0.9

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS507-010	LDW-SS602-010 [a]	LDW-SS508-010	LDW-SS509-010	LDW-SS510-010	LDW-SS511-010
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	10.5	7.3	3.5	8.6	14.0	6.4
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	12.8	13.4	16.6	6.9	13.7	16.9
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	16.3	16.3	21.6	5.5	15.9	19.9
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	14.8	14.5	13.9	5.6	14.6	17.4
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	10.4	10	9.7	3.7	9.0	12.7
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	8.4	7.8	8.8	3.0	7.3	8.9
Fractional % phi 10+ (<0.98 micron)	% dw	13.8	12.6	10.3	5.0	11.5	16.2
Total gravel	% dw	0.4	0.1	1.1	7.3	0.1	0.1
Total sand	% dw	12.5	17.7	14.7	54.4	13.9	1.7
Total silt	% dw	54.4	51.5	55.6	26.6	58.2	60.6
Total clay	% dw	32.6	31	28.8	11.7	27.8	37.7
Total fines (percent silt+clay)	% dw	87.0	82	84.4	38.3	86.0	98.3
Conventionals							
Total organic carbon (TOC)	% dw	1.79	1.97	6.30	7.08	1.99	2.53
Total solids	% ww	47.20	47.00	41.73	40.30	48.60	43.70

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS512-010	LDW-SS513-010	LDW-SS514-010	LDW-SS515-010	LDW-SS516-010	LDW-SS517-010
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.217 U	0.588 U	0.381 J	0.696 J	0.395 J	0.488 J
1,2,3,7,8-PeCDD	ng/kg dw	0.743 J	2.11 J	1.43 J	2.27 J	1.09 J	1.53 J
1,2,3,4,7,8-HxCDD	ng/kg dw	1.25 J	4.61 J	2.41 J	3.70 J	1.87 J	2.63 J
1,2,3,6,7,8-HxCDD	ng/kg dw	5.20 J	22.5	12.9	13.0	8.76	11.4
1,2,3,7,8,9-HxCDD	ng/kg dw	4.12 J	13.7 J	7.65	10.0	5.43	7.85
1,2,3,4,6,7,8-HpCDD	ng/kg dw	145	690	333	289	223	304
OCDD	ng/kg dw	1,590	6,650	3,450	2,800	2,380	2,970
2,3,7,8-TCDF	ng/kg dw	0.692 J	2.48	1.62	1.72	1.13	1.57
1,2,3,7,8-PeCDF	ng/kg dw	0.424 J	1.80 U	1.14 J	1.06 J	1.00 J	0.754 J
2,3,4,7,8-PeCDF	ng/kg dw	0.970 J	3.56 J	3.48 J	2.22 J	3.29 J	2.02 J
1,2,3,4,7,8-HxCDF	ng/kg dw	4.46 J	19.6	24.2	7.53	16.5	7.62
1,2,3,6,7,8-HxCDF	ng/kg dw	1.19 J	7.00 J	4.58	2.69 J	3.06 J	2.09 J
1,2,3,7,8,9-HxCDF	ng/kg dw	0.0960 J	0.500 U	0.335 J	0.200 J	0.231 J	0.158 J
2,3,4,6,7,8-HxCDF	ng/kg dw	0.782 J	3.24 J	2.53 J	2.19 J	1.68 J	1.55 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	30.8	150	93.2	56.2	56.9	62.9
1,2,3,4,7,8,9-HpCDF	ng/kg dw	2.43 J	12.8 J	10.7	4.20 J	4.82	4.96
OCDF	ng/kg dw	136	760	312	242	272	346
Total TCDD	ng/kg dw	2.77	7.48	6.75	8.08	4.61	5.67
Total PeCDD	ng/kg dw	5.91	13.0 J	11.3	15.8	8.31	13.0
Total HxCDD	ng/kg dw	53.0	204	111	107	69.7	108
Total HpCDD	ng/kg dw	469	2,030	973	814	562	865
Total TCDF	ng/kg dw	12.6	42.1	26.9	32.4	22.0	27.4
Total PeCDF	ng/kg dw	16.1	62.9	46.6	46.0	41.3	30.3
Total HxCDF	ng/kg dw	45.7	214	164	95.7	117	90.7
Total HpCDF	ng/kg dw	119	662	360	205	239	267
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	5.23 J	21.6 J	14.0 J	12.2 J	10.0 J	10.9 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	3.8	1.1	0.2	23.6	1.8	9.0
Fractional % phi -1-0 (1000-2000 microns)	% dw	2.6	1.0	1.1	2.7	2.9	6.3
Fractional % phi 0-1 (500-1000 microns)	% dw	12.9	2.2	5.9	2.5	6.5	4.9
Fractional % phi 1-2 (250-500 microns)	% dw	27.6	3.8	10.7	7.1	7.2	3.9
Fractional % phi 2-3 (125-250 microns)	% dw	12.2	2.5	15.4	10.5	2.5	3.1
Fractional % phi 3-4 (62.5-125 microns)	% dw	4.5	2.3	11.1	5.8	6.0	6.0

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS512-010	LDW-SS513-010	LDW-SS514-010	LDW-SS515-010	LDW-SS516-010	LDW-SS517-010
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	4.5	6.2	7.1	10.3	8.7	9.7
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	5.4	14.6	11.4	7.8	15.2	13.2
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	7.3	18.7	11.5	9.4	16.1	13.5
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	5.9	15.4	10.9	6.1	11.8	10.1
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	4.3	10.7	4.7	4.7	7.4	7.1
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	3.4	7.7	4.1	3.2	4.8	4.6
Fractional % phi 10+ (<0.98 micron)	% dw	5.7	13.9	5.9	6.4	9.0	8.5
Total gravel	% dw	3.8	1.1	0.2	23.6	1.8	9.0
Total sand	% dw	59.8	11.8	44.2	28.6	25.1	24.2
Total silt	% dw	23.1	54.9	40.9	33.6	51.8	46.5
Total clay	% dw	13.4	32.3	14.7	14.3	21.2	20.2
Total fines (percent silt+clay)	% dw	36.5	87.2	55.6	47.9	73.0	66.7
Conventionals							
Total organic carbon (TOC)	% dw	1.74	2.13	1.63	2.86	1.96	2.40
Total solids	% ww	64.50	47.90	53.40	53.80	53.20	52.80

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS518-010	LDW-SS519-010	LDW-SS520-010	LDW-SS521-010	LDW-SS522-010	LDW-SS523-010
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.226 U	0.354 J	0.378	0.304 J	0.660 J	0.438 J
1,2,3,7,8-PeCDD	ng/kg dw	0.560 J	0.675 J	1.42	0.713 J	2.81 J	1.28 J
1,2,3,4,7,8-HxCDD	ng/kg dw	0.903 J	1.19 J	2.45	1.17 J	5.08 J	2.37 J
1,2,3,6,7,8-HxCDD	ng/kg dw	2.52 J	4.02 J	8.06	4.24 J	16.4	8.79
1,2,3,7,8,9-HxCDD	ng/kg dw	2.56 J	3.33 J	7.46	3.19 J	14.1	7.65
1,2,3,4,6,7,8-HpCDD	ng/kg dw	55.1	95.8	196	97.1	435	311
OCDD	ng/kg dw	525	892	1,910	984	4,150	3,960
2,3,7,8-TCDF	ng/kg dw	0.351 J	0.596 J	1.18	0.653 J	1.52	0.739 J
1,2,3,7,8-PeCDF	ng/kg dw	0.262 J	0.314 J	0.595 J	0.327 J	1.01 J	0.385 J
2,3,4,7,8-PeCDF	ng/kg dw	0.423 J	0.696 J	1.59	0.761 J	2.68 J	0.837 J
1,2,3,4,7,8-HxCDF	ng/kg dw	1.26 J	2.61 J	4.54	2.52 J	10.4	2.92 J
1,2,3,6,7,8-HxCDF	ng/kg dw	0.494 J	0.845 J	2.00	0.872 J	2.86 J	1.01 J
1,2,3,7,8,9-HxCDF	ng/kg dw	0.0670 J	0.121 J	0.146 J	0.0760 J	0.218 J	0.104 J
2,3,4,6,7,8-HxCDF	ng/kg dw	0.387 J	0.657 J	1.88 J	0.708 J	1.99 J	0.867 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	9.79	17.6	36.2	19.3	62.3	27.8
1,2,3,4,7,8,9-HpCDF	ng/kg dw	0.793 J	1.52 J	2.54	1.56 J	4.55 J	1.81 J
OCDF	ng/kg dw	36.4	74.8	142	90.4	290	125
Total TCDD	ng/kg dw	2.13	4.42	4.78	3.78	7.33	2.60
Total PeCDD	ng/kg dw	3.94	6.57	9.71	4.67	14.7	6.11
Total HxCDD	ng/kg dw	24.3	38.5	74.9	36.3	152	77.8
Total HpCDD	ng/kg dw	139	261	577	270	1,210	732
Total TCDF	ng/kg dw	6.11	10.6	22.8	11.5	25.8	8.75
Total PeCDF	ng/kg dw	6.68	12.1	28.1	12.7	39.4	14.4
Total HxCDF	ng/kg dw	14.8	30.3	57.8	32.3	103	41.8
Total HpCDF	ng/kg dw	30.3	65.8	128	74.9	233	91.0
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	2.49 J	4.02 J	8.03 J	4.10 J	15.9 J	9.06 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	0.1	0.1 U	1.3	0.1 U	0.1 U	6.8
Fractional % phi -1-0 (1000-2000 microns)	% dw	1.4	2.0	2.0	0.1 U	0.2	5.1
Fractional % phi 0-1 (500-1000 microns)	% dw	0.6	1.7	8.3	1.1	0.4	17.3
Fractional % phi 1-2 (250-500 microns)	% dw	0.4	1.6	21.3	1.6	0.7	29.4
Fractional % phi 2-3 (125-250 microns)	% dw	2.0	2.1	13.5	4.0	0.7	17.5
Fractional % phi 3-4 (62.5-125 microns)	% dw	13.6	8.6	6.0	17.3	1.3	10.2

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS518-010	LDW-SS519-010	LDW-SS520-010	LDW-SS521-010	LDW-SS522-010	LDW-SS523-010
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	10.8	10.8	4.0	14.2	6.6	5.3
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	17.7	17.6	8.6	13.7	18.5	1.8
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	15.1	16.5	10.0	13.9	27.9	1.7
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	13.6	13.3	9.1	12.6	18.3	1.4
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	9.7	9.3	5.6	7.7	10.3	1.3
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	5.3	5.6	3.3	4.7	5.3	1.1
Fractional % phi 10+ (<0.98 micron)	% dw	9.7	11.0	7.1	9.1	9.6	1.3
Total gravel	% dw	0.1	0.1 U	1.3	0.1 U	0.1 U	6.8
Total sand	% dw	18.0	16.0	51.1	24.0	3.3	79.5
Total silt	% dw	57.2	58.2	31.7	54.4	71.3	10.2
Total clay	% dw	24.7	25.9	16.0	21.5	25.2	3.7
Total fines (percent silt+clay)	% dw	81.9	84.1	47.7	75.9	96.5	13.9
Conventionals							
Total organic carbon (TOC)	% dw	2.06	2.17	2.10	2.18	2.86	0.982
Total solids	% ww	52.50	47.10	59.70 J	50.70	43.20	76.70

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS601-010 [a]	LDW-SS524-010	LDW-SS525-010	LDW-SS526-010	LDW-SS527-010	LDW-SS603-010 [a]
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	na	0.334 J	0.113 U	0.524 J	0.306 J	na
1,2,3,7,8-PeCDD	ng/kg dw	na	0.815 J	0.281 J	3.31 J	0.706 J	na
1,2,3,4,7,8-HxCDD	ng/kg dw	na	1.44 J	0.473 J	6.78	1.12 J	na
1,2,3,6,7,8-HxCDD	ng/kg dw	na	5.92 J	1.70 J	19.1	3.98 J	na
1,2,3,7,8,9-HxCDD	ng/kg dw	na	4.46 J	1.57 J	18.8	3.65 J	na
1,2,3,4,6,7,8-HpCDD	ng/kg dw	na	164	47.9	502	98.5	na
OCDD	ng/kg dw	na	1,630	487	4,480	970	na
2,3,7,8-TCDF	ng/kg dw	na	0.622 J	0.144 U	0.983 J	0.608 J	na
1,2,3,7,8-PeCDF	ng/kg dw	na	0.387 J	0.0940 J	0.538 J	0.329 J	na
2,3,4,7,8-PeCDF	ng/kg dw	na	0.914 J	0.236 J	1.44 J	0.763 J	na
1,2,3,4,7,8-HxCDF	ng/kg dw	na	2.93 J	1.01 J	4.98	2.65 J	na
1,2,3,6,7,8-HxCDF	ng/kg dw	na	1.03 J	0.299 J	2.24 J	0.890 J	na
1,2,3,7,8,9-HxCDF	ng/kg dw	na	0.0710 J	0.148 J	0.129 J	0.0770 J	na
2,3,4,6,7,8-HxCDF	ng/kg dw	na	0.820 J	0.247 J	1.79 J	0.660 J	na
1,2,3,4,6,7,8-HpCDF	ng/kg dw	na	23.4	8.46	74.7	17.6	na
1,2,3,4,7,8,9-HpCDF	ng/kg dw	na	1.64 J	0.505 J	4.72 J	1.36 J	na
OCDF	ng/kg dw	na	85.0	48.6	205	66.1	na
Total TCDD	ng/kg dw	na	4.31	0.247	5.67	3.33	na
Total PeCDD	ng/kg dw	na	5.69 J	1.52	14.9	5.30 J	na
Total HxCDD	ng/kg dw	na	52.1	16.3	139	36.6	na
Total HpCDD	ng/kg dw	na	397	122	1,030	271	na
Total TCDF	ng/kg dw	na	13.4	1.99	22.7	11.4	na
Total PeCDF	ng/kg dw	na	14.6	3.40	29.1	11.9	na
Total HxCDF	ng/kg dw	na	33.5	9.53	72.9	28.3	na
Total HpCDF	ng/kg dw	na	79.9	27.4	186	59.9	na
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	na	5.57 J	1.69 J	17.0 J	4.10 J	na
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	8.7	0.1 U	0.9	2.9	1.1	0.4
Fractional % phi -1-0 (1000-2000 microns)	% dw	5.6	0.2	0.5	3.8	0.3	2.7
Fractional % phi 0-1 (500-1000 microns)	% dw	17.3	0.3	19.3	24.6	0.9	2.1
Fractional % phi 1-2 (250-500 microns)	% dw	28.9	0.4	57.6	29.7	1.3	2.4
Fractional % phi 2-3 (125-250 microns)	% dw	17.2	1.4	8.6	15.9	2.3	4.6
Fractional % phi 3-4 (62.5-125 microns)	% dw	9.9	7.0	5.3	6.1	8.9	12.9

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS601-010 [a]	LDW-SS524-010	LDW-SS525-010	LDW-SS526-010	LDW-SS527-010	LDW-SS603-010 [a]
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	3.9	13.8	2.3	3.4	18.2	16.9
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	1.8	20.2	1.3	3.0	23.2	18.1
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	1.7	18.5	1.1	3.1	18.7	15.9
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	1.5	14.0	0.9	2.8	11.6	10.1
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	1.2	8.6	0.6	1.9	5.0	4.4
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	1.0	5.2	0.4	1.0	2.6	3.0
Fractional % phi 10+ (<0.98 micron)	% dw	1.1	10.1	1.2	1.6	6.1	6.3
Total gravel	% dw	8.7	0.1 U	0.9	2.9	1.1	0.4
Total sand	% dw	78.9	9.3	91.3	80.1	13.7	24.7
Total silt	% dw	8.9	66.5	5.6	12.3	71.7	61.0
Total clay	% dw	3.3	23.9	2.2	4.5	13.7	13.7
Total fines (percent silt+clay)	% dw	12.2	90.4	7.8	16.8	85.4	74.7
Conventionals							
Total organic carbon (TOC)	% dw	0.906	2.40	0.673	1.79	2.18	2.43
Total solids	% ww	77.80	47.40	73.67	68.80	47.13	47.40

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS528-010	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS532-010	LDW-SS533-043-comp
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.790 J	0.459	1.77	0.126 U	0.197 J	0.403
1,2,3,7,8-PeCDD	ng/kg dw	2.89 J	1.53	7.19	0.354 J	0.524 J	1.22
1,2,3,4,7,8-HxCDD	ng/kg dw	5.00 J	2.47	10.6	0.544 J	0.744 J	1.88
1,2,3,6,7,8-HxCDD	ng/kg dw	16.2	8.11	39.2	1.85	2.60 J	6.10
1,2,3,7,8,9-HxCDD	ng/kg dw	14.2	6.80	32.9	1.60	2.27 J	5.30
1,2,3,4,6,7,8-HpCDD	ng/kg dw	357	230	1,030	38.6	62.7	122
OCDD	ng/kg dw	3,330	2,370	9,590	365	737	980
2,3,7,8-TCDF	ng/kg dw	5.54	1.98	5.37	0.410 J	0.765 J	0.998 U
1,2,3,7,8-PeCDF	ng/kg dw	2.07 J	1.02	2.21 J	0.212 J	0.357 J	0.541 J
2,3,4,7,8-PeCDF	ng/kg dw	5.17	2.06	4.83	0.298 J	0.773 J	1.24
1,2,3,4,7,8-HxCDF	ng/kg dw	18.5	5.53	10.8	0.692 J	1.76 J	6.86
1,2,3,6,7,8-HxCDF	ng/kg dw	7.39	2.34	5.23	0.369 J	0.745 J	1.78
1,2,3,7,8,9-HxCDF	ng/kg dw	0.340 J	0.146 J	0.365 J	0.981 U	0.0530 U	0.150 J
2,3,4,6,7,8-HxCDF	ng/kg dw	3.52 J	1.81	4.86 J	0.293 J	0.604 J	1.22
1,2,3,4,6,7,8-HpCDF	ng/kg dw	65.2	34.2	95.5	6.47	14.0	32.0
1,2,3,4,7,8,9-HpCDF	ng/kg dw	7.35	3.25	6.76	0.361 J	0.864 J	3.29
OCDF	ng/kg dw	205	151	303	19.0	43.6	86.2
Total TCDD	ng/kg dw	12.0	12.0	18.1	2.30	3.32	6.20
Total PeCDD	ng/kg dw	21.1	18.2	42.9	3.67	4.47 J	9.20
Total HxCDD	ng/kg dw	145	64.8	463	17.6	29.4	47.3
Total HpCDD	ng/kg dw	892	427	4,510	126	251	242
Total TCDF	ng/kg dw	85.6	34.4	84.5	4.67	16.3	18.1
Total PeCDF	ng/kg dw	90.6	32.2	125	6.97	16.0	28.4
Total HxCDF	ng/kg dw	139	55.5	184	12.3	21.5	60.0
Total HpCDF	ng/kg dw	206	128	314	19.4	39.2	108
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	17.7 J	8.99 J	35.7 J	1.71 J	2.93 J	6.28 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	0.6	24.1	1.7	9.6	1.8	13.1
Fractional % phi -1-0 (1000-2000 microns)	% dw	0.8	6.2	3.3	5.7	2.1	4.5
Fractional % phi 0-1 (500-1000 microns)	% dw	1.1	15.8	9.2	15.9	2.9	9.9
Fractional % phi 1-2 (250-500 microns)	% dw	0.7	24.1	17.8	29.4	7.9	30.6
Fractional % phi 2-3 (125-250 microns)	% dw	1.0	11.5	12.4	12.9	12.9	18.1
Fractional % phi 3-4 (62.5-125 microns)	% dw	2.5	6.2	14.0	4.6	25.8	7.1

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS528-010	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS532-010	LDW-SS533-043-comp
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	8.5	2.7	10.8	4.5	20.3	4.5
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	31.7	2.4	9.2	3.2	9.4	3.4
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	27.5	2.2	7.2	3.5	5.8	2.6
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	9.3	1.9	4.9	3.4	3.8	1.7
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	5.0	1.1	3.4	2.8	2.7	1.5
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	3.4	0.7	2.8	1.8	1.4	1.0
Fractional % phi 10+ (<0.98 micron)	% dw	7.9	1.3	3.3	2.7	3.2	2.0
Total gravel	% dw	0.6	24.1	1.7	9.6	1.8	13.1
Total sand	% dw	6.1	63.8	56.7	68.5	51.6	70.2
Total silt	% dw	77.0	9.2	32.1	14.6	39.3	12.2
Total clay	% dw	16.3	3.1	9.5	7.3	7.3	4.5
Total fines (percent silt+clay)	% dw	93.3	12.3	41.6	21.9	46.6	16.7
Conventionals							
Total organic carbon (TOC)	% dw	3.04	1.47	1.56	1.23	2.27	1.40
Total solids	% ww	40.80	75.60 J	81.20	73.30	51.30	74.40

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS534-010	LDW-SS535-010	LDW-SS536-010	LDW-SS537-010	LDW-SS538-010	LDW-SS539-010
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.179 J	0.303 U	0.155 J	0.250 J	0.689 J	0.152 U
1,2,3,7,8-PeCDD	ng/kg dw	0.370 J	1.43 J	0.260 J	0.790 J	1.91 J	0.270 J
1,2,3,4,7,8-HxCDD	ng/kg dw	0.630 J	2.26 J	0.375 J	1.27 J	2.39 J	0.389 J
1,2,3,6,7,8-HxCDD	ng/kg dw	2.42 J	6.20	1.17 J	4.93 J	12.1	1.29 J
1,2,3,7,8,9-HxCDD	ng/kg dw	1.89 J	6.09	1.10 J	3.52 J	9.28	1.12 J
1,2,3,4,6,7,8-HpCDD	ng/kg dw	59.3	142	25.4	111	361	26.1
OCDD	ng/kg dw	632	1,520	262	1,020	4,440	258
2,3,7,8-TCDF	ng/kg dw	0.389 J	1.23	0.219 J	0.605 J	3.39	0.236 U
1,2,3,7,8-PeCDF	ng/kg dw	0.231 J	0.617 J	0.107 J	0.339 J	1.56 J	0.135 J
2,3,4,7,8-PeCDF	ng/kg dw	0.505 J	1.53 J	0.215 J	0.726 J	4.38 J	0.246 J
1,2,3,4,7,8-HxCDF	ng/kg dw	2.16 J	4.70 J	0.650 J	2.16 J	16.6	0.834 J
1,2,3,6,7,8-HxCDF	ng/kg dw	0.578 J	1.97 J	0.244 J	0.849 J	5.40	0.300 J
1,2,3,7,8,9-HxCDF	ng/kg dw	4.80 U	0.0840 U	5.24 U	0.0900 J	0.301 J	5.14 U
2,3,4,6,7,8-HxCDF	ng/kg dw	0.472 J	1.40 J	0.197 J	0.771 J	3.26 J	0.258 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	11.4	25.4	4.91 J	22.2	67.6	5.44
1,2,3,4,7,8,9-HpCDF	ng/kg dw	0.969 J	2.10 J	0.368 J	1.41 J	7.87	0.393 J
OCDF	ng/kg dw	44.6	87.6	17.1	73.2	234	22.1
Total TCDD	ng/kg dw	2.08	3.55	1.16 J	2.59	8.31	0.959 J
Total PeCDD	ng/kg dw	2.63	7.85	1.54 J	4.40 J	13.4	2.02 J
Total HxCDD	ng/kg dw	21.5	58.0	10.2	39.7	115	11.2
Total HpCDD	ng/kg dw	180	515	61.4	293	976	63.7
Total TCDF	ng/kg dw	6.38	18.3	3.65	10.1	43.2	3.87
Total PeCDF	ng/kg dw	8.38	32.5	3.44 J	12.7	57.6	3.65 J
Total HxCDF	ng/kg dw	18.5	49.4	7.49	30.9	113	9.27
Total HpCDF	ng/kg dw	39.4	81.0	14.7	65.6	219	18.4
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	2.72 J	6.63 J	1.53 J	4.36 J	15.0 J	1.52 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	1.7	42.3	0.1 U	0.1 U	0.5	0.2
Fractional % phi -1-0 (1000-2000 microns)	% dw	2.3	6.5	0.1 U	0.8	1.7	0.6
Fractional % phi 0-1 (500-1000 microns)	% dw	12.6	7.9	0.4	7.1	5.9	8.2
Fractional % phi 1-2 (250-500 microns)	% dw	36.1	21.8	2.2	16.6	15.4	28.3
Fractional % phi 2-3 (125-250 microns)	% dw	10.3	12.1	65.7	13.2	12.4	24.7
Fractional % phi 3-4 (62.5-125 microns)	% dw	7.0	2.9	13.8	11.5	10.5	8.7

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS534-010	LDW-SS535-010	LDW-SS536-010	LDW-SS537-010	LDW-SS538-010	LDW-SS539-010
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	7.7	0.5	4.7	7.7	15.1	10.8
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	7.0	2.1	4.3	12.1	11.8	6.0
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	5.4	0.5	3.3	12.3	9.9	4.3
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	3.5	0.9	1.9	7.6	5.7	2.7
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	2.0	0.8	0.8	3.7	3.4	1.7
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	1.5	0.4	0.7	2.3	2.5	1.1
Fractional % phi 10+ (<0.98 micron)	% dw	3.0	1.1	2.0	5.0	5.2	2.7
Total gravel	% dw	1.7	42.3	0.1 U	0.1 U	0.5	0.2
Total sand	% dw	68.3	51.2	82.1	49.2	45.9	70.5
Total silt	% dw	23.6	4.0	14.2	39.7	42.5	23.8
Total clay	% dw	6.5	2.3	3.5	11.0	11.1	5.5
Total fines (percent silt+clay)	% dw	30.1	6.3	17.7	50.7	53.6	29.3
Conventionals							
Total organic carbon (TOC)	% dw	1.72	1.38	1.05	1.54	2.15	1.37
Total solids	% ww	64.60	69.00	65.80	54.30	60.10	67.10

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS540-010	LDW-SS541-010	LDW-SS542-010	LDW-SS543-010	LDW-SS544-010-comp	LDW-SS545-010
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.605 J	0.126 J	0.351 J	0.205 U	0.606	0.0610 J
1,2,3,7,8-PeCDD	ng/kg dw	1.56 J	0.220 J	0.568 J	0.479 J	0.690 J	0.0700 J
1,2,3,4,7,8-HxCDD	ng/kg dw	1.92 J	0.354 U	0.641 J	0.738 J	0.911 J	0.123 J
1,2,3,6,7,8-HxCDD	ng/kg dw	5.82	1.92 J	2.11 J	2.20 J	2.87	0.197 J
1,2,3,7,8,9-HxCDD	ng/kg dw	6.91	1.06 J	1.96 J	2.20 J	2.73	0.198 J
1,2,3,4,6,7,8-HpCDD	ng/kg dw	96.8	50.7	39.5	42.8	60.1	2.77 J
OCDD	ng/kg dw	769	496	367	373	548	21.5
2,3,7,8-TCDF	ng/kg dw	1.87	0.269 J	0.423 U	0.370 J	0.927 J	0.0740 U
1,2,3,7,8-PeCDF	ng/kg dw	0.712 J	0.119 J	0.238 J	0.181 J	0.414 U	4.51 U
2,3,4,7,8-PeCDF	ng/kg dw	2.15 J	0.287 J	0.424 J	0.328 J	0.948	0.0590 U
1,2,3,4,7,8-HxCDF	ng/kg dw	4.19 J	5.57	1.13 J	1.01 J	2.60	0.129 J
1,2,3,6,7,8-HxCDF	ng/kg dw	1.55 J	0.906 J	0.500 J	0.424 J	1.16	0.0610 J
1,2,3,7,8,9-HxCDF	ng/kg dw	0.0930 U	0.0630 J	0.0630 U	0.0440 J	0.102 U	0.0760 J
2,3,4,6,7,8-HxCDF	ng/kg dw	1.35 J	0.391 J	0.387 J	0.358 J	0.843 J	0.0740 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	17.9	35.1	8.27	8.78	14.0	0.750 J
1,2,3,4,7,8,9-HpCDF	ng/kg dw	2.18 J	3.06 J	0.577 J	0.609 J	1.15	0.120 J
OCDF	ng/kg dw	56.4	70.3	27.3	32.5	46.0	2.04 J
Total TCDD	ng/kg dw	9.34	1.04	2.14	1.76	4.78	0.122 J
Total PeCDD	ng/kg dw	13.4	1.21	3.79 J	3.35 J	5.70	0.0700 J
Total HxCDD	ng/kg dw	58.9	10.9	18.3	19.0	26.7	1.55 J
Total HpCDD	ng/kg dw	235	105	93.6	105	134	6.44
Total TCDF	ng/kg dw	36.0	2.83	6.85	5.70	19.4	0.337 J
Total PeCDF	ng/kg dw	45.5	4.30	8.26	6.18	18.1	0.0640 J
Total HxCDF	ng/kg dw	41.9	34.5	13.8	15.1	27.1	1.35 J
Total HpCDF	ng/kg dw	52.1	112	25.3	28.7	46.0	2.08 J
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	6.61 J	2.53 J	2.35 J	2.06 J	3.73 J	0.341 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	4.1	0.1	0.3	0.1 U	0.3	2.0
Fractional % phi -1-0 (1000-2000 microns)	% dw	3.9	0.3	0.6	2.0	1.2	14.8
Fractional % phi 0-1 (500-1000 microns)	% dw	7.9	1.4	1.9	0.9	5.5	41.0
Fractional % phi 1-2 (250-500 microns)	% dw	11.2	19.4	11.9	1.2	14.8	28.1
Fractional % phi 2-3 (125-250 microns)	% dw	10.0	48.5	19.4	6.8	11.7	7.9
Fractional % phi 3-4 (62.5-125 microns)	% dw	16.4	9.0	21.8	15.4	16.8	2.8

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS540-010	LDW-SS541-010	LDW-SS542-010	LDW-SS543-010	LDW-SS544-010-comp	LDW-SS545-010
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	15.0	7.1	16.9	17.6	13.9	1.2
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	10.2	4.0	9.3	20.9	13.2	0.5
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	6.9	3.3	6.7	15.4	7.4	0.4
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	5.4	2.4	4.2	8.3	4.6	0.4
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	2.8	1.1	2.3	3.4	3.4	0.2
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	2.4	1.0	1.8	2.4	2.2	0.1
Fractional % phi 10+ (<0.98 micron)	% dw	3.8	2.5	2.8	5.7	5.1	0.7
Total gravel	% dw	4.1	0.1	0.3	0.1 U	0.3	2.0
Total sand	% dw	49.4	78.6	55.6	26.3	50.0	94.6
Total silt	% dw	37.5	16.8	37.1	62.2	39.0	2.5
Total clay	% dw	9.0	4.6	6.9	11.5	10.7	1.0
Total fines (percent silt+clay)	% dw	46.5	21.4	44.0	73.7	49.7	3.5
Conventionals							
Total organic carbon (TOC)	% dw	1.45	1.10	1.16	3.64	1.88	1.01
Total solids	% ww	58.50	69.90	62.00	45.40	62.70	77.40

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS546-010	LDW-SS547-010
Dioxin/furan			
2,3,7,8-TCDD	ng/kg dw	0.276 U	0.299 U
1,2,3,7,8-PeCDD	ng/kg dw	0.546 J	0.942 J
1,2,3,4,7,8-HxCDD	ng/kg dw	0.948 J	1.21
1,2,3,6,7,8-HxCDD	ng/kg dw	2.77 J	3.61
1,2,3,7,8,9-HxCDD	ng/kg dw	2.55 J	3.81
1,2,3,4,6,7,8-HpCDD	ng/kg dw	52.3	76.5
OCDD	ng/kg dw	469	754
2,3,7,8-TCDF	ng/kg dw	0.693 U	0.859 J
1,2,3,7,8-PeCDF	ng/kg dw	0.238 J	0.350 J
2,3,4,7,8-PeCDF	ng/kg dw	0.461 J	0.795 J
1,2,3,4,7,8-HxCDF	ng/kg dw	0.963 J	1.64
1,2,3,6,7,8-HxCDF	ng/kg dw	0.532 J	0.897
1,2,3,7,8,9-HxCDF	ng/kg dw	0.0580 J	0.0710 J
2,3,4,6,7,8-HxCDF	ng/kg dw	0.463 J	0.843 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	10.2	14.0
1,2,3,4,7,8,9-HpCDF	ng/kg dw	0.650 J	0.931
OCDF	ng/kg dw	34.2	53.7
Total TCDD	ng/kg dw	2.37	5.48
Total PeCDD	ng/kg dw	3.95 J	7.69
Total HxCDD	ng/kg dw	22.5	34.2
Total HpCDD	ng/kg dw	122	175
Total TCDF	ng/kg dw	7.37	16.1
Total PeCDF	ng/kg dw	7.20	24.5
Total HxCDF	ng/kg dw	16.2	28.2
Total HpCDF	ng/kg dw	30.2	50.1
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	2.48 J	3.79 J
Grain size			
Fractional % phi >-1 (>2000 microns)	% dw	1.1	1.4
Fractional % phi -1-0 (1000-2000 microns)	% dw	2.6	1.2
Fractional % phi 0-1 (500-1000 microns)	% dw	13.2	1.9
Fractional % phi 1-2 (250-500 microns)	% dw	20.3	8.0
Fractional % phi 2-3 (125-250 microns)	% dw	8.8	17.9
Fractional % phi 3-4 (62.5-125 microns)	% dw	15.4	16.5

Table A-1-1. Results for dioxins and furans, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

na - data not available	Unit	LDW-SS546-010	LDW-SS547-010
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	12.1	12.7
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	7.1	14.1
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	5.9	9.5
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	4.6	6.3
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	3.5	4.6
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	2.5	2.5
Fractional % phi 10+ (<0.98 micron)	% dw	2.9	3.3
Total gravel	% dw	1.1	1.4
Total sand	% dw	60.3	45.5
Total silt	% dw	29.7	42.6
Total clay	% dw	8.9	10.4
Total fines (percent silt+clay)	% dw	38.6	53.0
Conventionals			
Total organic carbon (TOC)	% dw	2.60	2.04
Total solids	% ww	58.90	52.30 J

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
J – estimated concentration
na - data not available
OCDD – octachlorodibenzo-*p*-dioxin
OCDF – octachlorodibenzofuran
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
TEQ - toxic equivalent
U – not detected at reporting limit shown
ww – wet weight

Table A-1-2. Results for SMS chemicals in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS508-010	LDW-SS509-010	LDW-SS523-010	LDW-SS601-010 [a]	LDW-SS525-010	LDW-SS526-010	LDW-SS527-010
Metals										
Antimony	mg/kg dw	1 J	na	na	na	na	na	na	na	0.4 UJ
Arsenic	mg/kg dw	25.3	9.6	11.3	18.1	5.1	na	3.8	7.5	18.5
Cadmium	mg/kg dw	0.3 U	na	na	na	na	na	na	na	0.4 U
Chromium	mg/kg dw	16.7	na	na	na	na	na	na	na	20
Cobalt	mg/kg dw	4.6	na	na	na	na	na	na	na	6.7
Copper	mg/kg dw	37.3	na	na	na	na	na	na	na	31.4
Lead	mg/kg dw	50	na	na	na	na	na	na	na	10
Mercury	mg/kg dw	0.03 U	na	na	na	na	na	na	na	0.09 J
Molybdenum	mg/kg dw	2.2	na	na	na	na	na	na	na	1 U
Nickel	mg/kg dw	13 J	na	na	na	na	na	na	na	16 J
Selenium	mg/kg dw	0.7 U	na	na	na	na	na	na	na	0.9 U
Silver	mg/kg dw	0.4 U	na	na	na	na	na	na	na	0.6 U
Thallium	mg/kg dw	0.3 U	na	na	na	na	na	na	na	0.4 U
Vanadium	mg/kg dw	34.4	na	na	na	na	na	na	na	46.9
Zinc	mg/kg dw	133	na	na	na	na	na	na	na	62
PAHs										
1-Methylnaphthalene	µg/kg dw	na	31	4.8 U	55	4.8 U	4.8 U	4.8 U	9.0	na
2-Chloronaphthalene	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
2-Methylnaphthalene	µg/kg dw	20 U	22	4.8 U	58	4.8 U	4.8 U	4.8 U	11	20 U
Acenaphthene	µg/kg dw	20 U	28	4.8 U	92	4.8	6.3	4.8	26	11 J
Acenaphthylene	µg/kg dw	17 J	46	4.8 U	290	9.5	10	4.8 U	13	20 U
Anthracene	µg/kg dw	66	84	4.8 U	740	22	32	7.7	100	30
Benzo(a)anthracene	µg/kg dw	250	260	4.8 U	1,800	65	94	27	310	94
Benzo(a)pyrene	µg/kg dw	260	290	4.8 U	2,100	72	110	24	320	86
Benzo(b)fluoranthene	µg/kg dw	180 J	210 J	4.8 U	1,600 J	85 J	110 J	29 J	290 J	87 J
Benzo(g,h,i)perylene	µg/kg dw	140	180	4.8 U	1,400	66	81	15	190	54
Benzo(k)fluoranthene	µg/kg dw	180 J	210 J	4.8 U	1,600 J	85 J	110 J	29 J	290 J	87 J
Total benzofluoranthenes	µg/kg dw	360 J	420 J	4.8 U	3,200 J	170 J	220 J	58 J	580 J	174 J
Chrysene	µg/kg dw	300	390	4.8 U	2,600	150	180	51	500	150
Dibenzo(a,h)anthracene	µg/kg dw	62	45	4.8 U	500	17	26	5.8	70	26
Dibenzofuran	µg/kg dw	20 U	13	4.8 U	75	4.8 U	4.8 U	4.8	15	20 U
Fluoranthene	µg/kg dw	460	870	4.8 U	4,100	150	230 J	88	900	190
Fluorene	µg/kg dw	16 J	47	4.8 U	200	6.2	6.3	5.3	27	11 J
Indeno(1,2,3-cd)pyrene	µg/kg dw	130	150	4.8 U	1,200	49	68	14	170	50
Naphthalene	µg/kg dw	20 U	38	4.8 U	92	5.7	4.8 U	4.8 U	5.7	20 U
Phenanthrene	µg/kg dw	190	300	4.8 U	2,200	42	81	43	350	67
Pyrene	µg/kg dw	460	640	4.8 U	4,000	90	150	51	570	170
Total HPAHs	µg/kg dw	2,420 J	3,250 J	4.8 U	20,900 J	830 J	1,160 J	334 J	3,610 J	990 J
Total LPAHs	µg/kg dw	290 J	540	4.8 U	3,600	90	136	61	520	119 J
Total cPAHs	µg/kg dw	360 J	390 J	4.3 U	2,900 J	110 J	160 J	37 J	460 J	130 J

Table A-1-2. Results for SMS chemicals in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS508-010	LDW-SS509-010	LDW-SS523-010	LDW-SS601-010 [a]	LDW-SS525-010	LDW-SS526-010	LDW-SS527-010
Total PAHs	µg/kg dw	2,710 J	3,790 J	4.8 U	24,500 J	920 J	1,290 J	395 J	4,130 J	1,110 J
Phthalates										
Bis(2-ethylhexyl)phthalate	µg/kg dw	150	na	na	na	na	na	na	na	320
Butyl benzyl phthalate	µg/kg dw	25	na	na	na	na	na	na	na	22
Diethyl phthalate	µg/kg dw	15 U	na	na	na	na	na	na	na	15 U
Dimethyl phthalate	µg/kg dw	15 U	na	na	na	na	na	na	na	15 U
Di-n-butyl phthalate	µg/kg dw	20 U	na	na	na	na	na	na	na	20
Di-n-octyl phthalate	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
Other SVOCs										
1,2,4-Trichlorobenzene	µg/kg dw	6.1 U	na	na	na	na	na	na	na	6.2 U
1,2-Dichlorobenzene	µg/kg dw	6.1 U	na	na	na	na	na	na	na	6.2 U
1,3-Dichlorobenzene	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
1,4-Dichlorobenzene	µg/kg dw	6.1 U	na	na	na	na	na	na	na	6.2 U
2,4,5-Trichlorophenol	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
2,4,6-Trichlorophenol	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
2,4-Dichlorophenol	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
2,4-Dimethylphenol	µg/kg dw	6.1 U	na	na	na	na	na	na	na	6.2 U
2,4-Dinitrophenol	µg/kg dw	200 UJ	na	na	na	na	na	na	na	200 UJ
2,4-Dinitrotoluene	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
2,6-Dinitrotoluene	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
2-Chlorophenol	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
2-Methylphenol	µg/kg dw	6.1 U	na	na	na	na	na	na	na	6.2 U
2-Nitroaniline	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
2-Nitrophenol	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
3,3'-Dichlorobenzidine	µg/kg dw	99 UJ	na	na	na	na	na	na	na	99 UJ
3-Nitroaniline	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
4,6-Dinitro-o-cresol	µg/kg dw	200 U	na	na	na	na	na	na	na	200 U
4-Bromophenyl phenyl ether	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
4-Chloro-3-methylphenol	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
4-Chloroaniline	µg/kg dw	99 UJ	na	na	na	na	na	na	na	99 UJ
4-Chlorophenyl phenyl ether	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
4-Methylphenol	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
4-Nitroaniline	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
4-Nitrophenol	µg/kg dw	99 U	na	na	na	na	na	na	na	99 U
Aniline	µg/kg dw	20 UJ	na	na	na	na	na	na	na	20 UJ
Benzoic acid	µg/kg dw	50 J	na	na	na	na	na	na	na	48 J
Benzyl alcohol	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
bis(2-chloroethoxy)methane	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
bis(2-chloroethyl)ether	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
bis(2-chloroisopropyl)ether	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
Carbazole	µg/kg dw	14 J	na	na	na	na	na	na	na	20 U

Table A-1-2. Results for SMS chemicals in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS508-010	LDW-SS509-010	LDW-SS523-010	LDW-SS601-010 [a]	LDW-SS525-010	LDW-SS526-010	LDW-SS527-010
Hexachlorobenzene	µg/kg dw	6.1 UJ	na	na	na	na	na	na	na	6.2 UJ
Hexachlorobutadiene	µg/kg dw	6.1 U	na	na	na	na	na	na	na	6.2 U
Hexachlorocyclopentadiene	µg/kg dw	99 UJ	na	na	na	na	na	na	na	99 UJ
Hexachloroethane	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
Isophorone	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
n-Nitroso-di-n-propylamine	µg/kg dw	30 U	na	na	na	na	na	na	na	31 U
n-Nitrosodimethylamine	µg/kg dw	30 U	na	na	na	na	na	na	na	31 U
n-Nitrosodiphenylamine	µg/kg dw	6.1 UJ	na	na	na	na	na	na	na	6.2 UJ
Nitrobenzene	µg/kg dw	20 U	na	na	na	na	na	na	na	20 U
Pentachlorophenol	µg/kg dw	30 U	na	na	na	na	na	na	na	31 U
Phenol	µg/kg dw	17 J	na	na	na	na	na	na	na	21
PCBs										
Aroclor-1016	µg/kg dw	20 U	3.8 U	0.8 U	48 U	20 U	na	3.9 U	20 U	4.0 U
Aroclor-1221	µg/kg dw	20 U	3.8 U	0.8 U	48 U	20 U	na	3.9 U	20 U	4.0 U
Aroclor-1232	µg/kg dw	20 U	3.8 U	0.8 U	48 U	20 U	na	3.9 U	20 U	4.0 U
Aroclor-1242	µg/kg dw	20 U	3.8 U	0.8 U	48 U	20 U	na	3.9 U	20 U	4.0 U
Aroclor-1248	µg/kg dw	20 U	3.8 U	0.8 U	190 U	20 U	na	4.8	99 U	23
Aroclor-1254	µg/kg dw	60	16	0.8 U	410	34	na	8.3	260	37
Aroclor-1260	µg/kg dw	26	10	0.8 U	150	32	na	6.5	100	31
Aroclor-1262	µg/kg dw	20 U	3.8 U	0.8 U	48 U	20 U	na	3.9 U	20 U	4.0 U
Aroclor-1268	µg/kg dw	20 UJ	3.8 UJ	0.8 UJ	48 UJ	20 UJ	na	3.9 UJ	20 UJ	4.0 UJ
Total PCBs	µg/kg dw	86	26	0.8 UJ	560	66	na	19.6	360	91

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
na - not analyzed
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TEQ - toxic equivalent

U – not detected at reporting limit shown

UJ – not detected at estimated reporting limit shown

Table A-1-2. Results for SMS chemicals in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS603-010 [a]	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS533-043-comp	LDW-SS544-010-comp	LDW-SS547-010
Metals								
Antimony	mg/kg dw	0.4 UJ	na	na	na	na	na	na
Arsenic	mg/kg dw	16.7	93.8	19.1	6.4	4.3	6.4	8.3
Cadmium	mg/kg dw	0.4 U	na	na	na	na	na	na
Chromium	mg/kg dw	25.8	na	na	na	na	na	na
Cobalt	mg/kg dw	8.6	na	na	na	na	na	na
Copper	mg/kg dw	39.7	na	na	na	na	na	na
Lead	mg/kg dw	15	na	na	na	na	na	na
Mercury	mg/kg dw	0.10 J	na	na	na	na	na	na
Molybdenum	mg/kg dw	0.9 U	na	na	na	na	na	na
Nickel	mg/kg dw	21 J	na	na	na	na	na	na
Selenium	mg/kg dw	1 U	na	na	na	na	na	na
Silver	mg/kg dw	0.6 U	na	na	na	na	na	na
Thallium	mg/kg dw	0.4 U	na	na	na	na	na	na
Vanadium	mg/kg dw	60.7	na	na	na	na	na	na
Zinc	mg/kg dw	80	na	na	na	na	na	na
PAHs								
1-Methylnaphthalene	µg/kg dw	na	26	560	4.9 U	4.7 U	4.8 U	4.7 U
2-Chloronaphthalene	µg/kg dw	20 U	na	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	20 U	29	660	4.9 U	5.1	4.8 U	4.7 U
Acenaphthene	µg/kg dw	11 J	330	970	4.9 U	7.5	4.8 U	4.7 U
Acenaphthylene	µg/kg dw	20 U	15	150	22	4.7 U	4.8 U	4.7 U
Anthracene	µg/kg dw	31	2,000	1,800	30	12	4.8	11
Benzo(a)anthracene	µg/kg dw	90	7,500	3,100	48	36	16	62
Benzo(a)pyrene	µg/kg dw	94	4,900	3,200	51	42	19	77
Benzo(b)fluoranthene	µg/kg dw	94 J	3,900 J	2,200 J	48 J	36 J	20 J	71 J
Benzo(g,h,i)perylene	µg/kg dw	46	2,200	2,300	68	34	20	63
Benzo(k)fluoranthene	µg/kg dw	94 J	3,900 J	2,200 J	48 J	36 J	20 J	71 J
Total benzofluoranthenes	µg/kg dw	188 J	7,800 J	4,400 J	96 J	72 J	40 J	142 J
Chrysene	µg/kg dw	140	7,900	3,800	67	51	23	92
Dibenzo(a,h)anthracene	µg/kg dw	22	870	580	15	12	5.7	25
Dibenzofuran	µg/kg dw	11 J	120	460	4.9 U	4.7 U	4.8 U	4.7 U
Fluoranthene	µg/kg dw	230	16,000	8,100	100	88	44	170
Fluorene	µg/kg dw	11 J	300	820	4.9 U	4.7	4.8 U	4.7 U
Indeno(1,2,3-cd)pyrene	µg/kg dw	45	2,000	1,600	41	27	14	51
Naphthalene	µg/kg dw	20 U	62	1,000	4.9 U	4.7 U	4.8 U	4.7 U
Phenanthrene	µg/kg dw	94	2,600	7,100	30	32	17	50
Pyrene	µg/kg dw	170	12,000	7,400	67	79	32	120
Total HPAHs	µg/kg dw	1,030 J	61,000 J	34,500 J	550 J	441 J	214 J	800 J
Total LPAHs	µg/kg dw	147 J	5,300	11,800	82	56	22	61
Total cPAHs	µg/kg dw	140 J	7,100 J	4,400 J	76 J	61 J	29 J	110 J

Table A-1-2. Results for SMS chemicals in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS603-010 [a]	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS533-043-comp	LDW-SS544-010-comp	LDW-SS547-010
Total PAHs	µg/kg dw	1,170 J	66,000 J	46,300 J	640 J	497 J	236 J	860 J
Phthalates								
Bis(2-ethylhexyl)phthalate	µg/kg dw	230	na	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	22	na	na	na	na	na	na
Diethyl phthalate	µg/kg dw	15 U	na	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	180	na	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	37	na	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	20 U	na	na	na	na	na	na
Other SVOCs								
1,2,4-Trichlorobenzene	µg/kg dw	6.1 U	na	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	6.1 U	na	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	20 U	na	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	6.1 U	na	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	99 U	na	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	99 U	na	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	99 U	na	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	6.1 U	na	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	200 UJ	na	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	99 U	na	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	99 U	na	na	na	na	na	na
2-Chlorophenol	µg/kg dw	20 U	na	na	na	na	na	na
2-Methylphenol	µg/kg dw	6.1 U	na	na	na	na	na	na
2-Nitroaniline	µg/kg dw	99 U	na	na	na	na	na	na
2-Nitrophenol	µg/kg dw	99 U	na	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	99 UJ	na	na	na	na	na	na
3-Nitroaniline	µg/kg dw	99 U	na	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	200 U	na	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	20 U	na	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	99 U	na	na	na	na	na	na
4-Chloroaniline	µg/kg dw	99 UJ	na	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	20 U	na	na	na	na	na	na
4-Methylphenol	µg/kg dw	20 U	na	na	na	na	na	na
4-Nitroaniline	µg/kg dw	99 U	na	na	na	na	na	na
4-Nitrophenol	µg/kg dw	99 U	na	na	na	na	na	na
Aniline	µg/kg dw	20 UJ	na	na	na	na	na	na
Benzoic acid	µg/kg dw	62 J	na	na	na	na	na	na
Benzyl alcohol	µg/kg dw	20 U	na	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	20 U	na	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	20 U	na	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	20 U	na	na	na	na	na	na
Carbazole	µg/kg dw	11 J	na	na	na	na	na	na

Table A-1-2. Results for SMS chemicals in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS603-010 [a]	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS533-043-comp	LDW-SS544-010-comp	LDW-SS547-010
Hexachlorobenzene	µg/kg dw	6.1 UJ	na	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	6.1 U	na	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	99 UJ	na	na	na	na	na	na
Hexachloroethane	µg/kg dw	20 U	na	na	na	na	na	na
Isophorone	µg/kg dw	20 U	na	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	30 U	na	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	30 U	na	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	6.1 UJ	na	na	na	na	na	na
Nitrobenzene	µg/kg dw	20 U	na	na	na	na	na	na
Pentachlorophenol	µg/kg dw	30 U	na	na	na	na	na	na
Phenol	µg/kg dw	20	na	na	na	na	na	na
PCBs								
Aroclor-1016	µg/kg dw	4.0 U	19 U	31 U	3.9 U	20 U	3.9 U	3.9 U
Aroclor-1221	µg/kg dw	4.0 U	19 U	31 U	3.9 U	20 U	3.9 U	3.9 U
Aroclor-1232	µg/kg dw	4.0 U	19 U	31 U	3.9 U	20 U	3.9 U	3.9 U
Aroclor-1242	µg/kg dw	4.0 U	19 U	31 U	3.9 U	20 U	3.9 U	3.9 U
Aroclor-1248	µg/kg dw	23	290 U	320	4.9 U	75	31	12 U
Aroclor-1254	µg/kg dw	35	860	390	11	140	55	18
Aroclor-1260	µg/kg dw	20	150 U	150	10	64	41	12
Aroclor-1262	µg/kg dw	4.0 U	19 U	31 U	3.9 U	20 U	3.9 U	3.9 U
Aroclor-1268	µg/kg dw	4.0 UJ	19 UJ	31 UJ	3.9 UJ	20 UJ	3.9 UJ	3.9 UJ
Total PCBs	µg/kg dw	78	860	860	21	280	127	30

[a] This is a field duplicate sample of the sample directly preceding it.
dw – dry weight
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
na - not analyzed
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TEQ - toxic equivalent

U – not detected at reporting limit shown

UJ – not detected at estimated reporting limit shown

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS501-010	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS504-010	LDW-SS505-010	LDW-SS506-010	LDW-SS507-010	LDW-SS602-010 [a]
Metals									
Antimony	mg/kg dw	na	1 J	na	na	na	na	na	na
Arsenic	mg/kg dw	na	25.3	9.6	na	na	na	na	na
Cadmium	mg/kg dw	na	0.3 U	na	na	na	na	na	na
Chromium	mg/kg dw	na	16.7	na	na	na	na	na	na
Cobalt	mg/kg dw	na	4.6	na	na	na	na	na	na
Copper	mg/kg dw	na	37.3	na	na	na	na	na	na
Lead	mg/kg dw	na	50	na	na	na	na	na	na
Mercury	mg/kg dw	na	0.03 U	na	na	na	na	na	na
Molybdenum	mg/kg dw	na	2.2	na	na	na	na	na	na
Nickel	mg/kg dw	na	13 J	na	na	na	na	na	na
Selenium	mg/kg dw	na	0.7 U	na	na	na	na	na	na
Silver	mg/kg dw	na	0.4 U	na	na	na	na	na	na
Thallium	mg/kg dw	na	0.3 U	na	na	na	na	na	na
Vanadium	mg/kg dw	na	34.4	na	na	na	na	na	na
Zinc	mg/kg dw	na	133	na	na	na	na	na	na
PAHs									
1-Methylnaphthalene	µg/kg dw	na	na	31	na	na	na	na	na
2-Chloronaphthalene	µg/kg dw	na	20 U	na	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	na	20 U	22	na	na	na	na	na
Acenaphthene	µg/kg dw	na	20 U	28	na	na	na	na	na
Acenaphthylene	µg/kg dw	na	17 J	46	na	na	na	na	na
Anthracene	µg/kg dw	na	66	84	na	na	na	na	na
Benzo(a)anthracene	µg/kg dw	na	250	260	na	na	na	na	na
Benzo(a)pyrene	µg/kg dw	na	260	290	na	na	na	na	na
Benzo(b)fluoranthene	µg/kg dw	na	180 J	210 J	na	na	na	na	na
Benzo(g,h,i)perylene	µg/kg dw	na	140	180	na	na	na	na	na
Benzo(k)fluoranthene	µg/kg dw	na	180 J	210 J	na	na	na	na	na
Total benzofluoranthenes	µg/kg dw	na	360 J	420 J	na	na	na	na	na
Chrysene	µg/kg dw	na	300	390	na	na	na	na	na
Dibenzo(a,h)anthracene	µg/kg dw	na	62	45	na	na	na	na	na
Dibenzofuran	µg/kg dw	na	20 U	13	na	na	na	na	na
Fluoranthene	µg/kg dw	na	460	870	na	na	na	na	na
Fluorene	µg/kg dw	na	16 J	47	na	na	na	na	na
Indeno(1,2,3-cd)pyrene	µg/kg dw	na	130	150	na	na	na	na	na
Naphthalene	µg/kg dw	na	20 U	38	na	na	na	na	na
Phenanthrene	µg/kg dw	na	190	300	na	na	na	na	na
Pyrene	µg/kg dw	na	460	640	na	na	na	na	na
Total HPAHs	µg/kg dw	na	2,420 J	3,250 J	na	na	na	na	na
Total LPAHs	µg/kg dw	na	290 J	540	na	na	na	na	na
Total cPAHs	µg/kg dw	na	360 J	390 J	na	na	na	na	na
Total PAHs	µg/kg dw	na	2,710 J	3,790 J	na	na	na	na	na
Phthalates									

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS501-010	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS504-010	LDW-SS505-010	LDW-SS506-010	LDW-SS507-010	LDW-SS602-010 [a]
Bis(2-ethylhexyl)phthalate	µg/kg dw	na	150	na	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	na	25	na	na	na	na	na	na
Diethyl phthalate	µg/kg dw	na	15 U	na	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	na	15 U	na	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	na	20 U	na	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	na	20 U	na	na	na	na	na	na
Other SVOCs									
1,2,4-Trichlorobenzene	µg/kg dw	na	6.1 U	na	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	na	6.1 U	na	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	na	20 U	na	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	na	6.1 U	na	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	na	99 U	na	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	na	99 U	na	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	na	99 U	na	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	na	6.1 U	na	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	na	200 UJ	na	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	na	99 U	na	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	na	99 U	na	na	na	na	na	na
2-Chlorophenol	µg/kg dw	na	20 U	na	na	na	na	na	na
2-Methylphenol	µg/kg dw	na	6.1 U	na	na	na	na	na	na
2-Nitroaniline	µg/kg dw	na	99 U	na	na	na	na	na	na
2-Nitrophenol	µg/kg dw	na	99 U	na	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	na	99 UJ	na	na	na	na	na	na
3-Nitroaniline	µg/kg dw	na	99 U	na	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	na	200 U	na	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	na	20 U	na	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	na	99 U	na	na	na	na	na	na
4-Chloroaniline	µg/kg dw	na	99 UJ	na	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	na	20 U	na	na	na	na	na	na
4-Methylphenol	µg/kg dw	na	20 U	na	na	na	na	na	na
4-Nitroaniline	µg/kg dw	na	99 U	na	na	na	na	na	na
4-Nitrophenol	µg/kg dw	na	99 U	na	na	na	na	na	na
Aniline	µg/kg dw	na	20 UJ	na	na	na	na	na	na
Benzoic acid	µg/kg dw	na	50 J	na	na	na	na	na	na
Benzyl alcohol	µg/kg dw	na	20 U	na	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	na	20 U	na	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	na	20 U	na	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	na	20 U	na	na	na	na	na	na
Carbazole	µg/kg dw	na	14 J	na	na	na	na	na	na
Hexachlorobenzene	µg/kg dw	na	6.1 UJ	na	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	na	6.1 U	na	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	na	99 UJ	na	na	na	na	na	na
Hexachloroethane	µg/kg dw	na	20 U	na	na	na	na	na	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS501-010	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS504-010	LDW-SS505-010	LDW-SS506-010	LDW-SS507-010	LDW-SS602-010 [a]
Isophorone	µg/kg dw	na	20 U	na	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	na	30 U	na	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	na	30 U	na	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	na	6.1 UJ	na	na	na	na	na	na
Nitrobenzene	µg/kg dw	na	20 U	na	na	na	na	na	na
Pentachlorophenol	µg/kg dw	na	30 U	na	na	na	na	na	na
Phenol	µg/kg dw	na	17 J	na	na	na	na	na	na
PCBs									
Aroclor-1016	µg/kg dw	na	20 U	3.8 U	na	na	na	na	na
Aroclor-1221	µg/kg dw	na	20 U	3.8 U	na	na	na	na	na
Aroclor-1232	µg/kg dw	na	20 U	3.8 U	na	na	na	na	na
Aroclor-1242	µg/kg dw	na	20 U	3.8 U	na	na	na	na	na
Aroclor-1248	µg/kg dw	na	20 U	3.8 U	na	na	na	na	na
Aroclor-1254	µg/kg dw	na	60	16	na	na	na	na	na
Aroclor-1260	µg/kg dw	na	26	10	na	na	na	na	na
Aroclor-1262	µg/kg dw	na	20 U	3.8 U	na	na	na	na	na
Aroclor-1268	µg/kg dw	na	20 UJ	3.8 UJ	na	na	na	na	na
Total PCBs	µg/kg dw	na	86	26	na	na	na	na	na
Dioxin/furan									
2,3,7,8-TCDD	ng/kg dw	0.398 J	0.122 U	0.279 U	0.150 U	0.535 J	0.608 J	0.453 J	na
1,2,3,7,8-PeCDD	ng/kg dw	1.55 J	0.491 U	0.518 J	0.277 U	2.16 J	2.14 J	1.44 J	na
1,2,3,4,7,8-HxCDD	ng/kg dw	2.68 J	0.704 J	0.630 J	0.479 J	3.89 J	4.17 J	2.51 J	na
1,2,3,6,7,8-HxCDD	ng/kg dw	10.1	2.14	2.31	2.27 J	15.1	14.8	10.9	na
1,2,3,7,8,9-HxCDD	ng/kg dw	7.63	1.80	1.82	1.57 J	11.1	10.8	7.39	na
1,2,3,4,6,7,8-HpCDD	ng/kg dw	248	42.5	42.0	50.9	392	358	315	na
OCDD	ng/kg dw	2,360	393	410	497	3,840	3,440	4,080	na
2,3,7,8-TCDF	ng/kg dw	1.27	0.900 U	1.11	0.437 J	2.28	2.06	1.55	na
1,2,3,7,8-PeCDF	ng/kg dw	0.717 J	0.383 J	0.447 J	0.205 J	1.17 J	1.16 J	0.944 J	na
2,3,4,7,8-PeCDF	ng/kg dw	1.59 J	0.667 J	0.977	0.467 J	2.59 J	2.62 J	1.96 J	na
1,2,3,4,7,8-HxCDF	ng/kg dw	5.02 J	1.34	2.47	2.43 J	8.71	10.4	8.00	na
1,2,3,6,7,8-HxCDF	ng/kg dw	1.73 J	0.736 J	1.08	0.561 J	2.89 J	3.06 J	2.20 J	na
1,2,3,7,8,9-HxCDF	ng/kg dw	0.167 J	0.0660 U	1.01 U	0.0670 U	0.230 J	0.200 J	0.197 J	na
2,3,4,6,7,8-HxCDF	ng/kg dw	1.43 J	0.690 J	0.964 J	0.378 J	2.34 J	2.43 J	1.63 J	na
1,2,3,4,6,7,8-HpCDF	ng/kg dw	40.5	19.4	15.2	14.0	73.6	78.2	58.4	na
1,2,3,4,7,8,9-HpCDF	ng/kg dw	2.79 J	0.752 J	1.06	1.33 J	5.29	5.98	4.56 J	na
OCDF	ng/kg dw	165	40.9	53.2	63.6	323	320	285	na
Total TCDD	ng/kg dw	6.25	4.40	7.17	1.68	8.43	7.58	5.93	na
Total PeCDD	ng/kg dw	12.4	5.38	7.90	2.23	15.2	14.8	11.2	na
Total HxCDD	ng/kg dw	99.4	21.4	20.2	18.9	141	125	104	na
Total HpCDD	ng/kg dw	738	110	85.6	136	1,110	945	1,080	na
Total TCDF	ng/kg dw	22.3	10.2	21.6	5.63	33.7	38.4	23.9	na
Total PeCDF	ng/kg dw	26.7	10.8	26.5	7.09	44.7	47.6	32.5	na
Total HxCDF	ng/kg dw	62.6	20.1	29.9	22.3	111	117	95.6	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS501-010	LDW-SS502-010-comp	LDW-SS503-043-comp	LDW-SS504-010	LDW-SS505-010	LDW-SS506-010	LDW-SS507-010	LDW-SS602-010 [a]
Total HpCDF	ng/kg dw	145	48.1	49.5	56.4	279	282	242	na
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	9.12 J	2.06 J	2.77 J	2.01 J	14.1 J	13.9 J	11.0 J	na
Grain size									
Fractional % phi >-1 (>2000 microns)	% dw	34.3	7.9	4.1	1	1.0	0.1 U	0.4	0.1
Fractional % phi -1-0 (1000-2000 microns)	% dw	1.9	5.1	3.5	2.0	1.2	0.3	0.6	2.5
Fractional % phi 0-1 (500-1000 microns)	% dw	3.4	18.3	18.1	10.9	2.2	0.6	1.1	2.2
Fractional % phi 1-2 (250-500 microns)	% dw	12.0	39.7	41.2	27.3	6.7	2.0	1.5	2.8
Fractional % phi 2-3 (125-250 microns)	% dw	6.4	19.3	16.4	16.1	11.9	10.9	3.2	3.8
Fractional % phi 3-4 (62.5-125 microns)	% dw	3.0	3.6	4.5	3.6	9.6	13.9	6.1	6.4
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	3.8	1.3	2.5	4.3	9.6	10.2	10.5	7.3
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	6.3	0.7	2.6	6.3	11.3	11.4	12.8	13.4
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	7.4	0.5	1.9	7.4	12.8	13.3	16.3	16.3
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	3.6	0.7	1.4	6.5	10.6	11.4	14.8	14.5
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	7.8	0.9	1.2	4.2	7.0	7.9	10.4	10
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	4.1	0.8	0.9	3.8	6.1	6.7	8.4	7.8
Fractional % phi 10+ (<0.98 micron)	% dw	5.9	1.1	1.7	6.4	10.0	11.4	13.8	12.6
Total gravel	% dw	34.3	7.9	4.1	1	1.0	0.1 U	0.4	0.1
Total sand	% dw	26.7	86.0	83.7	59.8	31.6	27.7	12.5	17.7
Total silt	% dw	21.1	3.2	8.4	24.5	44.3	46.3	54.4	51.5
Total clay	% dw	17.8	2.8	3.8	14.3	23.1	26.0	32.6	31
Total fines (percent silt+clay)	% dw	38.9	6.0	12.2	38.9	67.4	72.3	87.0	82
Conventionals									
Total organic carbon (TOC)	% dw	2.17	2.00	1.29	1.38	1.80	2.12	1.79	1.97
Total solids	% ww	51.10	73.10 J	76.20 J	68.30	55.30	56.40	47.20	47.00

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
na - not analyzed
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TEQ - toxic equivalent
U – not detected at reporting limit shown
UJ – not detected at estimated reporting limit shown
ww – wet weight

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS508-010	LDW-SS509-010	LDW-SS510-010	LDW-SS511-010	LDW-SS512-010	LDW-SS513-010	LDW-SS514-010	LDW-SS515-010
Metals									
Antimony	mg/kg dw	na	na	na	na	na	na	na	na
Arsenic	mg/kg dw	11.3	18.1	na	na	na	na	na	na
Cadmium	mg/kg dw	na	na	na	na	na	na	na	na
Chromium	mg/kg dw	na	na	na	na	na	na	na	na
Cobalt	mg/kg dw	na	na	na	na	na	na	na	na
Copper	mg/kg dw	na	na	na	na	na	na	na	na
Lead	mg/kg dw	na	na	na	na	na	na	na	na
Mercury	mg/kg dw	na	na	na	na	na	na	na	na
Molybdenum	mg/kg dw	na	na	na	na	na	na	na	na
Nickel	mg/kg dw	na	na	na	na	na	na	na	na
Selenium	mg/kg dw	na	na	na	na	na	na	na	na
Silver	mg/kg dw	na	na	na	na	na	na	na	na
Thallium	mg/kg dw	na	na	na	na	na	na	na	na
Vanadium	mg/kg dw	na	na	na	na	na	na	na	na
Zinc	mg/kg dw	na	na	na	na	na	na	na	na
PAHs									
1-Methylnaphthalene	µg/kg dw	4.8 U	55	na	na	na	na	na	na
2-Chloronaphthalene	µg/kg dw	na	na	na	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	4.8 U	58	na	na	na	na	na	na
Acenaphthene	µg/kg dw	4.8 U	92	na	na	na	na	na	na
Acenaphthylene	µg/kg dw	4.8 U	290	na	na	na	na	na	na
Anthracene	µg/kg dw	4.8 U	740	na	na	na	na	na	na
Benzo(a)anthracene	µg/kg dw	4.8 U	1,800	na	na	na	na	na	na
Benzo(a)pyrene	µg/kg dw	4.8 U	2,100	na	na	na	na	na	na
Benzo(b)fluoranthene	µg/kg dw	4.8 U	1,600 J	na	na	na	na	na	na
Benzo(g,h,i)perylene	µg/kg dw	4.8 U	1,400	na	na	na	na	na	na
Benzo(k)fluoranthene	µg/kg dw	4.8 U	1,600 J	na	na	na	na	na	na
Total benzofluoranthenes	µg/kg dw	4.8 U	3,200 J	na	na	na	na	na	na
Chrysene	µg/kg dw	4.8 U	2,600	na	na	na	na	na	na
Dibenzo(a,h)anthracene	µg/kg dw	4.8 U	500	na	na	na	na	na	na
Dibenzofuran	µg/kg dw	4.8 U	75	na	na	na	na	na	na
Fluoranthene	µg/kg dw	4.8 U	4,100	na	na	na	na	na	na
Fluorene	µg/kg dw	4.8 U	200	na	na	na	na	na	na
Indeno(1,2,3-cd)pyrene	µg/kg dw	4.8 U	1,200	na	na	na	na	na	na
Naphthalene	µg/kg dw	4.8 U	92	na	na	na	na	na	na
Phenanthrene	µg/kg dw	4.8 U	2,200	na	na	na	na	na	na
Pyrene	µg/kg dw	4.8 U	4,000	na	na	na	na	na	na
Total HPAHs	µg/kg dw	4.8 U	20,900 J	na	na	na	na	na	na
Total LPAHs	µg/kg dw	4.8 U	3,600	na	na	na	na	na	na
Total cPAHs	µg/kg dw	4.3 U	2,900 J	na	na	na	na	na	na
Total PAHs	µg/kg dw	4.8 U	24,500 J	na	na	na	na	na	na
Phthalates									

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS508-010	LDW-SS509-010	LDW-SS510-010	LDW-SS511-010	LDW-SS512-010	LDW-SS513-010	LDW-SS514-010	LDW-SS515-010
Bis(2-ethylhexyl)phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Diethyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Other SVOCs									
1,2,4-Trichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na	na	na
2-Chlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2-Methylphenol	µg/kg dw	na	na	na	na	na	na	na	na
2-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na	na
2-Nitrophenol	µg/kg dw	na	na	na	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	na	na	na	na	na	na	na	na
3-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	na	na	na	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	na	na	na	na	na	na	na	na
4-Chloroaniline	µg/kg dw	na	na	na	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na	na	na
4-Methylphenol	µg/kg dw	na	na	na	na	na	na	na	na
4-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na	na
4-Nitrophenol	µg/kg dw	na	na	na	na	na	na	na	na
Aniline	µg/kg dw	na	na	na	na	na	na	na	na
Benzoic acid	µg/kg dw	na	na	na	na	na	na	na	na
Benzyl alcohol	µg/kg dw	na	na	na	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	na	na	na	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	na	na	na	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	na	na	na	na	na	na	na	na
Carbazole	µg/kg dw	na	na	na	na	na	na	na	na
Hexachlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	na	na	na	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	na	na	na	na	na	na	na	na
Hexachloroethane	µg/kg dw	na	na	na	na	na	na	na	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS508-010	LDW-SS509-010	LDW-SS510-010	LDW-SS511-010	LDW-SS512-010	LDW-SS513-010	LDW-SS514-010	LDW-SS515-010
Isophorone	µg/kg dw	na	na	na	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	na	na	na	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	na	na	na	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	na	na	na	na	na	na	na	na
Nitrobenzene	µg/kg dw	na	na	na	na	na	na	na	na
Pentachlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
Phenol	µg/kg dw	na	na	na	na	na	na	na	na
PCBs									
Aroclor-1016	µg/kg dw	0.8 U	48 U	na	na	na	na	na	na
Aroclor-1221	µg/kg dw	0.8 U	48 U	na	na	na	na	na	na
Aroclor-1232	µg/kg dw	0.8 U	48 U	na	na	na	na	na	na
Aroclor-1242	µg/kg dw	0.8 U	48 U	na	na	na	na	na	na
Aroclor-1248	µg/kg dw	0.8 U	190 U	na	na	na	na	na	na
Aroclor-1254	µg/kg dw	0.8 U	410	na	na	na	na	na	na
Aroclor-1260	µg/kg dw	0.8 U	150	na	na	na	na	na	na
Aroclor-1262	µg/kg dw	0.8 U	48 U	na	na	na	na	na	na
Aroclor-1268	µg/kg dw	0.8 UJ	48 UJ	na	na	na	na	na	na
Total PCBs	µg/kg dw	0.8 UJ	560	na	na	na	na	na	na
Dioxin/furan									
2,3,7,8-TCDD	ng/kg dw	0.0580 U	5.59	0.324 J	0.386 J	0.217 U	0.588 U	0.381 J	0.696 J
1,2,3,7,8-PeCDD	ng/kg dw	4.92 U	15.3	1.04 J	1.09 J	0.743 J	2.11 J	1.43 J	2.27 J
1,2,3,4,7,8-HxCDD	ng/kg dw	0.0610 U	13.7	1.61 J	1.92 J	1.25 J	4.61 J	2.41 J	3.70 J
1,2,3,6,7,8-HxCDD	ng/kg dw	0.0810 J	47.7	5.92	7.40	5.20 J	22.5	12.9	13.0
1,2,3,7,8,9-HxCDD	ng/kg dw	0.198 J	41.8	4.64 J	5.81	4.12 J	13.7 J	7.65	10.0
1,2,3,4,6,7,8-HpCDD	ng/kg dw	1.48 J	600	141	192	145	690	333	289
OCDD	ng/kg dw	11.3	5,090	1,380	1,960	1,590	6,650	3,450	2,800
2,3,7,8-TCDF	ng/kg dw	1.01 U	55.4	0.801 J	1.00 J	0.692 J	2.48	1.62	1.72
1,2,3,7,8-PeCDF	ng/kg dw	4.36 U	28.8	0.472 J	0.550 J	0.424 J	1.80 U	1.14 J	1.06 J
2,3,4,7,8-PeCDF	ng/kg dw	4.45 U	54.8	0.994 J	1.30 J	0.970 J	3.56 J	3.48 J	2.22 J
1,2,3,4,7,8-HxCDF	ng/kg dw	4.74 U	39.4	3.56 J	4.79 J	4.46 J	19.6	24.2	7.53
1,2,3,6,7,8-HxCDF	ng/kg dw	4.50 U	30.2	1.17 J	1.48 J	1.19 J	7.00 J	4.58	2.69 J
1,2,3,7,8,9-HxCDF	ng/kg dw	4.97 U	2.35 J	0.106 J	0.108 U	0.0960 J	0.500 U	0.335 J	0.200 J
2,3,4,6,7,8-HxCDF	ng/kg dw	5.02 U	32.9	0.901 J	1.24 J	0.782 J	3.24 J	2.53 J	2.19 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	0.203 J	219	29.6	35.9	30.8	150	93.2	56.2
1,2,3,4,7,8,9-HpCDF	ng/kg dw	4.74 U	11.5	2.27 J	2.63 J	2.43 J	12.8 J	10.7	4.20 J
OCDF	ng/kg dw	0.673 J	385	149	168	136	760	312	242
Total TCDD	ng/kg dw	0.207	205	4.03	4.90	2.77	7.48	6.75	8.08
Total PeCDD	ng/kg dw	0.0990	232	7.47	7.80	5.91	13.0 J	11.3	15.8
Total HxCDD	ng/kg dw	1.44	511	56.8	73.1	53.0	204	111	107
Total HpCDD	ng/kg dw	3.59	1,910	410	594	469	2,030	973	814
Total TCDF	ng/kg dw	0.296	1,090	13.7	18.4	12.6	42.1	26.9	32.4
Total PeCDF	ng/kg dw	0.0700	716	17.7	21.6	16.1	62.9	46.6	46.0
Total HxCDF	ng/kg dw	0.217	566	46.0	59.7	45.7	214	164	95.7

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS508-010	LDW-SS509-010	LDW-SS510-010	LDW-SS511-010	LDW-SS512-010	LDW-SS513-010	LDW-SS514-010	LDW-SS515-010
Total HpCDF	ng/kg dw	0.527	594	122	133	119	662	360	205
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	4.31 J	74.5 J	5.73 J	7.20 J	5.23 J	21.6 J	14.0 J	12.2 J
Grain size									
Fractional % phi >-1 (>2000 microns)	% dw	1.1	7.3	0.1	0.1	3.8	1.1	0.2	23.6
Fractional % phi -1-0 (1000-2000 microns)	% dw	7.2	3.6	0.7	0.1	2.6	1.0	1.1	2.7
Fractional % phi 0-1 (500-1000 microns)	% dw	2.1	8.5	1.1	0.2	12.9	2.2	5.9	2.5
Fractional % phi 1-2 (250-500 microns)	% dw	2.0	19.3	1.7	0.3	27.6	3.8	10.7	7.1
Fractional % phi 2-3 (125-250 microns)	% dw	2.1	12.4	2.4	0.3	12.2	2.5	15.4	10.5
Fractional % phi 3-4 (62.5-125 microns)	% dw	1.3	10.6	8.0	0.9	4.5	2.3	11.1	5.8
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	3.5	8.6	14.0	6.4	4.5	6.2	7.1	10.3
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	16.6	6.9	13.7	16.9	5.4	14.6	11.4	7.8
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	21.6	5.5	15.9	19.9	7.3	18.7	11.5	9.4
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	13.9	5.6	14.6	17.4	5.9	15.4	10.9	6.1
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	9.7	3.7	9.0	12.7	4.3	10.7	4.7	4.7
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	8.8	3.0	7.3	8.9	3.4	7.7	4.1	3.2
Fractional % phi 10+ (<0.98 micron)	% dw	10.3	5.0	11.5	16.2	5.7	13.9	5.9	6.4
Total gravel	% dw	1.1	7.3	0.1	0.1	3.8	1.1	0.2	23.6
Total sand	% dw	14.7	54.4	13.9	1.7	59.8	11.8	44.2	28.6
Total silt	% dw	55.6	26.6	58.2	60.6	23.1	54.9	40.9	33.6
Total clay	% dw	28.8	11.7	27.8	37.7	13.4	32.3	14.7	14.3
Total fines (percent silt+clay)	% dw	84.4	38.3	86.0	98.3	36.5	87.2	55.6	47.9
Conventionals									
Total organic carbon (TOC)	% dw	6.30	7.08	1.99	2.53	1.74	2.13	1.63	2.86
Total solids	% ww	41.73	40.30	48.60	43.70	64.50	47.90	53.40	53.80

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight

HPAH – high-molecular-weight polycyclic aromatic hydrocarbon

J – estimated concentration

LPAH – low-molecular-weight polycyclic aromatic hydrocarbon

na - not analyzed

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

TEQ - toxic equivalent

U – not detected at reporting limit shown

UJ – not detected at estimated reporting limit shown

ww – wet weight

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS516-010	LDW-SS517-010	LDW-SS518-010	LDW-SS519-010	LDW-SS520-010	LDW-SS521-010	LDW-SS522-010
Metals								
Antimony	mg/kg dw	na	na	na	na	na	na	na
Arsenic	mg/kg dw	na	na	na	na	na	na	na
Cadmium	mg/kg dw	na	na	na	na	na	na	na
Chromium	mg/kg dw	na	na	na	na	na	na	na
Cobalt	mg/kg dw	na	na	na	na	na	na	na
Copper	mg/kg dw	na	na	na	na	na	na	na
Lead	mg/kg dw	na	na	na	na	na	na	na
Mercury	mg/kg dw	na	na	na	na	na	na	na
Molybdenum	mg/kg dw	na	na	na	na	na	na	na
Nickel	mg/kg dw	na	na	na	na	na	na	na
Selenium	mg/kg dw	na	na	na	na	na	na	na
Silver	mg/kg dw	na	na	na	na	na	na	na
Thallium	mg/kg dw	na	na	na	na	na	na	na
Vanadium	mg/kg dw	na	na	na	na	na	na	na
Zinc	mg/kg dw	na	na	na	na	na	na	na
PAHs								
1-Methylnaphthalene	µg/kg dw	na	na	na	na	na	na	na
2-Chloronaphthalene	µg/kg dw	na	na	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	na	na	na	na	na	na	na
Acenaphthene	µg/kg dw	na	na	na	na	na	na	na
Acenaphthylene	µg/kg dw	na	na	na	na	na	na	na
Anthracene	µg/kg dw	na	na	na	na	na	na	na
Benzo(a)anthracene	µg/kg dw	na	na	na	na	na	na	na
Benzo(a)pyrene	µg/kg dw	na	na	na	na	na	na	na
Benzo(b)fluoranthene	µg/kg dw	na	na	na	na	na	na	na
Benzo(g,h,i)perylene	µg/kg dw	na	na	na	na	na	na	na
Benzo(k)fluoranthene	µg/kg dw	na	na	na	na	na	na	na
Total benzofluoranthenes	µg/kg dw	na	na	na	na	na	na	na
Chrysene	µg/kg dw	na	na	na	na	na	na	na
Dibenzo(a,h)anthracene	µg/kg dw	na	na	na	na	na	na	na
Dibenzofuran	µg/kg dw	na	na	na	na	na	na	na
Fluoranthene	µg/kg dw	na	na	na	na	na	na	na
Fluorene	µg/kg dw	na	na	na	na	na	na	na
Indeno(1,2,3-cd)pyrene	µg/kg dw	na	na	na	na	na	na	na
Naphthalene	µg/kg dw	na	na	na	na	na	na	na
Phenanthrene	µg/kg dw	na	na	na	na	na	na	na
Pyrene	µg/kg dw	na	na	na	na	na	na	na
Total HPAHs	µg/kg dw	na	na	na	na	na	na	na
Total LPAHs	µg/kg dw	na	na	na	na	na	na	na
Total cPAHs	µg/kg dw	na	na	na	na	na	na	na
Total PAHs	µg/kg dw	na	na	na	na	na	na	na
Phthalates								

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS516-010	LDW-SS517-010	LDW-SS518-010	LDW-SS519-010	LDW-SS520-010	LDW-SS521-010	LDW-SS522-010
Bis(2-ethylhexyl)phthalate	µg/kg dw	na	na	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	na	na	na	na	na	na	na
Diethyl phthalate	µg/kg dw	na	na	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	na	na	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	na	na	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	na	na	na	na	na	na	na
Other SVOCs								
1,2,4-Trichlorobenzene	µg/kg dw	na	na	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	na	na	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	na	na	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	na	na	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	na	na	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	na	na	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na	na
2-Chlorophenol	µg/kg dw	na	na	na	na	na	na	na
2-Methylphenol	µg/kg dw	na	na	na	na	na	na	na
2-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na
2-Nitrophenol	µg/kg dw	na	na	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	na	na	na	na	na	na	na
3-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	na	na	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	na	na	na	na	na	na	na
4-Chloroaniline	µg/kg dw	na	na	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na	na
4-Methylphenol	µg/kg dw	na	na	na	na	na	na	na
4-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na
4-Nitrophenol	µg/kg dw	na	na	na	na	na	na	na
Aniline	µg/kg dw	na	na	na	na	na	na	na
Benzoic acid	µg/kg dw	na	na	na	na	na	na	na
Benzyl alcohol	µg/kg dw	na	na	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	na	na	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	na	na	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	na	na	na	na	na	na	na
Carbazole	µg/kg dw	na	na	na	na	na	na	na
Hexachlorobenzene	µg/kg dw	na	na	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	na	na	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	na	na	na	na	na	na	na
Hexachloroethane	µg/kg dw	na	na	na	na	na	na	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS516-010	LDW-SS517-010	LDW-SS518-010	LDW-SS519-010	LDW-SS520-010	LDW-SS521-010	LDW-SS522-010
Isophorone	µg/kg dw	na	na	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	na	na	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	na	na	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	na	na	na	na	na	na	na
Nitrobenzene	µg/kg dw	na	na	na	na	na	na	na
Pentachlorophenol	µg/kg dw	na	na	na	na	na	na	na
Phenol	µg/kg dw	na	na	na	na	na	na	na
PCBs								
Aroclor-1016	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1221	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1232	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1242	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1248	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1254	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1260	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1262	µg/kg dw	na	na	na	na	na	na	na
Aroclor-1268	µg/kg dw	na	na	na	na	na	na	na
Total PCBs	µg/kg dw	na	na	na	na	na	na	na
Dioxin/furan								
2,3,7,8-TCDD	ng/kg dw	0.395 J	0.488 J	0.226 U	0.354 J	0.378	0.304 J	0.660 J
1,2,3,7,8-PeCDD	ng/kg dw	1.09 J	1.53 J	0.560 J	0.675 J	1.42	0.713 J	2.81 J
1,2,3,4,7,8-HxCDD	ng/kg dw	1.87 J	2.63 J	0.903 J	1.19 J	2.45	1.17 J	5.08 J
1,2,3,6,7,8-HxCDD	ng/kg dw	8.76	11.4	2.52 J	4.02 J	8.06	4.24 J	16.4
1,2,3,7,8,9-HxCDD	ng/kg dw	5.43	7.85	2.56 J	3.33 J	7.46	3.19 J	14.1
1,2,3,4,6,7,8-HpCDD	ng/kg dw	223	304	55.1	95.8	196	97.1	435
OCDD	ng/kg dw	2,380	2,970	525	892	1,910	984	4,150
2,3,7,8-TCDF	ng/kg dw	1.13	1.57	0.351 J	0.596 J	1.18	0.653 J	1.52
1,2,3,7,8-PeCDF	ng/kg dw	1.00 J	0.754 J	0.262 J	0.314 J	0.595 J	0.327 J	1.01 J
2,3,4,7,8-PeCDF	ng/kg dw	3.29 J	2.02 J	0.423 J	0.696 J	1.59	0.761 J	2.68 J
1,2,3,4,7,8-HxCDF	ng/kg dw	16.5	7.62	1.26 J	2.61 J	4.54	2.52 J	10.4
1,2,3,6,7,8-HxCDF	ng/kg dw	3.06 J	2.09 J	0.494 J	0.845 J	2.00	0.872 J	2.86 J
1,2,3,7,8,9-HxCDF	ng/kg dw	0.231 J	0.158 J	0.0670 J	0.121 J	0.146 J	0.0760 J	0.218 J
2,3,4,6,7,8-HxCDF	ng/kg dw	1.68 J	1.55 J	0.387 J	0.657 J	1.88 J	0.708 J	1.99 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	56.9	62.9	9.79	17.6	36.2	19.3	62.3
1,2,3,4,7,8,9-HpCDF	ng/kg dw	4.82	4.96	0.793 J	1.52 J	2.54	1.56 J	4.55 J
OCDF	ng/kg dw	272	346	36.4	74.8	142	90.4	290
Total TCDD	ng/kg dw	4.61	5.67	2.13	4.42	4.78	3.78	7.33
Total PeCDD	ng/kg dw	8.31	13.0	3.94	6.57	9.71	4.67	14.7
Total HxCDD	ng/kg dw	69.7	108	24.3	38.5	74.9	36.3	152
Total HpCDD	ng/kg dw	562	865	139	261	577	270	1,210
Total TCDF	ng/kg dw	22.0	27.4	6.11	10.6	22.8	11.5	25.8
Total PeCDF	ng/kg dw	41.3	30.3	6.68	12.1	28.1	12.7	39.4
Total HxCDF	ng/kg dw	117	90.7	14.8	30.3	57.8	32.3	103

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS516-010	LDW-SS517-010	LDW-SS518-010	LDW-SS519-010	LDW-SS520-010	LDW-SS521-010	LDW-SS522-010
Total HpCDF	ng/kg dw	239	267	30.3	65.8	128	74.9	233
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	10.0 J	10.9 J	2.49 J	4.02 J	8.03 J	4.10 J	15.9 J
Grain size								
Fractional % phi >-1 (>2000 microns)	% dw	1.8	9.0	0.1	0.1 U	1.3	0.1 U	0.1 U
Fractional % phi -1-0 (1000-2000 microns)	% dw	2.9	6.3	1.4	2.0	2.0	0.1 U	0.2
Fractional % phi 0-1 (500-1000 microns)	% dw	6.5	4.9	0.6	1.7	8.3	1.1	0.4
Fractional % phi 1-2 (250-500 microns)	% dw	7.2	3.9	0.4	1.6	21.3	1.6	0.7
Fractional % phi 2-3 (125-250 microns)	% dw	2.5	3.1	2.0	2.1	13.5	4.0	0.7
Fractional % phi 3-4 (62.5-125 microns)	% dw	6.0	6.0	13.6	8.6	6.0	17.3	1.3
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	8.7	9.7	10.8	10.8	4.0	14.2	6.6
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	15.2	13.2	17.7	17.6	8.6	13.7	18.5
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	16.1	13.5	15.1	16.5	10.0	13.9	27.9
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	11.8	10.1	13.6	13.3	9.1	12.6	18.3
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	7.4	7.1	9.7	9.3	5.6	7.7	10.3
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	4.8	4.6	5.3	5.6	3.3	4.7	5.3
Fractional % phi 10+ (<0.98 micron)	% dw	9.0	8.5	9.7	11.0	7.1	9.1	9.6
Total gravel	% dw	1.8	9.0	0.1	0.1 U	1.3	0.1 U	0.1 U
Total sand	% dw	25.1	24.2	18.0	16.0	51.1	24.0	3.3
Total silt	% dw	51.8	46.5	57.2	58.2	31.7	54.4	71.3
Total clay	% dw	21.2	20.2	24.7	25.9	16.0	21.5	25.2
Total fines (percent silt+clay)	% dw	73.0	66.7	81.9	84.1	47.7	75.9	96.5
Conventionals								
Total organic carbon (TOC)	% dw	1.96	2.40	2.06	2.17	2.10	2.18	2.86
Total solids	% ww	53.20	52.80	52.50	47.10	59.70 J	50.70	43.20

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight

HPAH – high-molecular-weight polycyclic aromatic hydrocarbon

J – estimated concentration

LPAH – low-molecular-weight polycyclic aromatic hydrocarbon

na - not analyzed

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

TEQ - toxic equivalent

U – not detected at reporting limit shown

UJ – not detected at estimated reporting limit shown

ww – wet weight

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS523-010	LDW-SS601-010 [a]	LDW-SS524-010	LDW-SS525-010	LDW-SS526-010
Metals						
Antimony	mg/kg dw	na	na	na	na	na
Arsenic	mg/kg dw	5.1	na	na	3.8	7.5
Cadmium	mg/kg dw	na	na	na	na	na
Chromium	mg/kg dw	na	na	na	na	na
Cobalt	mg/kg dw	na	na	na	na	na
Copper	mg/kg dw	na	na	na	na	na
Lead	mg/kg dw	na	na	na	na	na
Mercury	mg/kg dw	na	na	na	na	na
Molybdenum	mg/kg dw	na	na	na	na	na
Nickel	mg/kg dw	na	na	na	na	na
Selenium	mg/kg dw	na	na	na	na	na
Silver	mg/kg dw	na	na	na	na	na
Thallium	mg/kg dw	na	na	na	na	na
Vanadium	mg/kg dw	na	na	na	na	na
Zinc	mg/kg dw	na	na	na	na	na
PAHs						
1-Methylnaphthalene	µg/kg dw	4.8 U	4.8 U	na	4.8 U	9.0
2-Chloronaphthalene	µg/kg dw	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	4.8 U	4.8 U	na	4.8 U	11
Acenaphthene	µg/kg dw	4.8	6.3	na	4.8	26
Acenaphthylene	µg/kg dw	9.5	10	na	4.8 U	13
Anthracene	µg/kg dw	22	32	na	7.7	100
Benzo(a)anthracene	µg/kg dw	65	94	na	27	310
Benzo(a)pyrene	µg/kg dw	72	110	na	24	320
Benzo(b)fluoranthene	µg/kg dw	85 J	110 J	na	29 J	290 J
Benzo(g,h,i)perylene	µg/kg dw	66	81	na	15	190
Benzo(k)fluoranthene	µg/kg dw	85 J	110 J	na	29 J	290 J
Total benzofluoranthenes	µg/kg dw	170 J	220 J	na	58 J	580 J
Chrysene	µg/kg dw	150	180	na	51	500
Dibenzo(a,h)anthracene	µg/kg dw	17	26	na	5.8	70
Dibenzofuran	µg/kg dw	4.8 U	4.8 U	na	4.8	15
Fluoranthene	µg/kg dw	150	230 J	na	88	900
Fluorene	µg/kg dw	6.2	6.3	na	5.3	27
Indeno(1,2,3-cd)pyrene	µg/kg dw	49	68	na	14	170
Naphthalene	µg/kg dw	5.7	4.8 U	na	4.8 U	5.7
Phenanthrene	µg/kg dw	42	81	na	43	350
Pyrene	µg/kg dw	90	150	na	51	570
Total HPAHs	µg/kg dw	830 J	1,160 J	na	334 J	3,610 J
Total LPAHs	µg/kg dw	90	136	na	61	520
Total cPAHs	µg/kg dw	110 J	160 J	na	37 J	460 J
Total PAHs	µg/kg dw	920 J	1,290 J	na	395 J	4,130 J
Phthalates						

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS523-010	LDW-SS601-010 [a]	LDW-SS524-010	LDW-SS525-010	LDW-SS526-010
Bis(2-ethylhexyl)phthalate	µg/kg dw	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	na	na	na	na	na
Diethyl phthalate	µg/kg dw	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	na	na	na	na	na
Other SVOCs						
1,2,4-Trichlorobenzene	µg/kg dw	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	na	na	na	na	na
2-Chlorophenol	µg/kg dw	na	na	na	na	na
2-Methylphenol	µg/kg dw	na	na	na	na	na
2-Nitroaniline	µg/kg dw	na	na	na	na	na
2-Nitrophenol	µg/kg dw	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	na	na	na	na	na
3-Nitroaniline	µg/kg dw	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	na	na	na	na	na
4-Chloroaniline	µg/kg dw	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	na	na	na	na	na
4-Methylphenol	µg/kg dw	na	na	na	na	na
4-Nitroaniline	µg/kg dw	na	na	na	na	na
4-Nitrophenol	µg/kg dw	na	na	na	na	na
Aniline	µg/kg dw	na	na	na	na	na
Benzoic acid	µg/kg dw	na	na	na	na	na
Benzyl alcohol	µg/kg dw	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	na	na	na	na	na
Carbazole	µg/kg dw	na	na	na	na	na
Hexachlorobenzene	µg/kg dw	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	na	na	na	na	na
Hexachloroethane	µg/kg dw	na	na	na	na	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS523-010	LDW-SS601-010 [a]	LDW-SS524-010	LDW-SS525-010	LDW-SS526-010
Isophorone	µg/kg dw	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	na	na	na	na	na
Nitrobenzene	µg/kg dw	na	na	na	na	na
Pentachlorophenol	µg/kg dw	na	na	na	na	na
Phenol	µg/kg dw	na	na	na	na	na
PCBs						
Aroclor-1016	µg/kg dw	20 U	na	na	3.9 U	20 U
Aroclor-1221	µg/kg dw	20 U	na	na	3.9 U	20 U
Aroclor-1232	µg/kg dw	20 U	na	na	3.9 U	20 U
Aroclor-1242	µg/kg dw	20 U	na	na	3.9 U	20 U
Aroclor-1248	µg/kg dw	20 U	na	na	4.8	99 U
Aroclor-1254	µg/kg dw	34	na	na	8.3	260
Aroclor-1260	µg/kg dw	32	na	na	6.5	100
Aroclor-1262	µg/kg dw	20 U	na	na	3.9 U	20 U
Aroclor-1268	µg/kg dw	20 UJ	na	na	3.9 UJ	20 UJ
Total PCBs	µg/kg dw	66	na	na	19.6	360
Dioxin/furan						
2,3,7,8-TCDD	ng/kg dw	0.438 J	na	0.334 J	0.113 U	0.524 J
1,2,3,7,8-PeCDD	ng/kg dw	1.28 J	na	0.815 J	0.281 J	3.31 J
1,2,3,4,7,8-HxCDD	ng/kg dw	2.37 J	na	1.44 J	0.473 J	6.78
1,2,3,6,7,8-HxCDD	ng/kg dw	8.79	na	5.92 J	1.70 J	19.1
1,2,3,7,8,9-HxCDD	ng/kg dw	7.65	na	4.46 J	1.57 J	18.8
1,2,3,4,6,7,8-HpCDD	ng/kg dw	311	na	164	47.9	502
OCDD	ng/kg dw	3,960	na	1,630	487	4,480
2,3,7,8-TCDF	ng/kg dw	0.739 J	na	0.622 J	0.144 U	0.983 J
1,2,3,7,8-PeCDF	ng/kg dw	0.385 J	na	0.387 J	0.0940 J	0.538 J
2,3,4,7,8-PeCDF	ng/kg dw	0.837 J	na	0.914 J	0.236 J	1.44 J
1,2,3,4,7,8-HxCDF	ng/kg dw	2.92 J	na	2.93 J	1.01 J	4.98
1,2,3,6,7,8-HxCDF	ng/kg dw	1.01 J	na	1.03 J	0.299 J	2.24 J
1,2,3,7,8,9-HxCDF	ng/kg dw	0.104 J	na	0.0710 J	0.148 J	0.129 J
2,3,4,6,7,8-HxCDF	ng/kg dw	0.867 J	na	0.820 J	0.247 J	1.79 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	27.8	na	23.4	8.46	74.7
1,2,3,4,7,8,9-HpCDF	ng/kg dw	1.81 J	na	1.64 J	0.505 J	4.72 J
OCDF	ng/kg dw	125	na	85.0	48.6	205
Total TCDD	ng/kg dw	2.60	na	4.31	0.247	5.67
Total PeCDD	ng/kg dw	6.11	na	5.69 J	1.52	14.9
Total HxCDD	ng/kg dw	77.8	na	52.1	16.3	139
Total HpCDD	ng/kg dw	732	na	397	122	1,030
Total TCDF	ng/kg dw	8.75	na	13.4	1.99	22.7
Total PeCDF	ng/kg dw	14.4	na	14.6	3.40	29.1
Total HxCDF	ng/kg dw	41.8	na	33.5	9.53	72.9

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS523-010	LDW-SS601-010 [a]	LDW-SS524-010	LDW-SS525-010	LDW-SS526-010
Total HpCDF	ng/kg dw	91.0	na	79.9	27.4	186
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	9.06 J	na	5.57 J	1.69 J	17.0 J
Grain size						
Fractional % phi >-1 (>2000 microns)	% dw	6.8	8.7	0.1 U	0.9	2.9
Fractional % phi -1-0 (1000-2000 microns)	% dw	5.1	5.6	0.2	0.5	3.8
Fractional % phi 0-1 (500-1000 microns)	% dw	17.3	17.3	0.3	19.3	24.6
Fractional % phi 1-2 (250-500 microns)	% dw	29.4	28.9	0.4	57.6	29.7
Fractional % phi 2-3 (125-250 microns)	% dw	17.5	17.2	1.4	8.6	15.9
Fractional % phi 3-4 (62.5-125 microns)	% dw	10.2	9.9	7.0	5.3	6.1
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	5.3	3.9	13.8	2.3	3.4
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	1.8	1.8	20.2	1.3	3.0
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	1.7	1.7	18.5	1.1	3.1
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	1.4	1.5	14.0	0.9	2.8
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	1.3	1.2	8.6	0.6	1.9
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	1.1	1.0	5.2	0.4	1.0
Fractional % phi 10+ (<0.98 micron)	% dw	1.3	1.1	10.1	1.2	1.6
Total gravel	% dw	6.8	8.7	0.1 U	0.9	2.9
Total sand	% dw	79.5	78.9	9.3	91.3	80.1
Total silt	% dw	10.2	8.9	66.5	5.6	12.3
Total clay	% dw	3.7	3.3	23.9	2.2	4.5
Total fines (percent silt+clay)	% dw	13.9	12.2	90.4	7.8	16.8
Conventionals						
Total organic carbon (TOC)	% dw	0.982	0.906	2.40	0.673	1.79
Total solids	% ww	76.70	77.80	47.40	73.67	68.80

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
na - not analyzed
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TEQ - toxic equivalent
U – not detected at reporting limit shown
UJ – not detected at estimated reporting limit shown
ww – wet weight

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS527-010	LDW-SS603-010 [a]	LDW-SS528-010	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS532-010	LDW-SS533-043-comp
Metals									
Antimony	mg/kg dw	0.4 UJ	0.4 UJ	na	na	na	na	na	na
Arsenic	mg/kg dw	18.5	16.7	na	93.8	19.1	6.4	na	4.3
Cadmium	mg/kg dw	0.4 U	0.4 U	na	na	na	na	na	na
Chromium	mg/kg dw	20	25.8	na	na	na	na	na	na
Cobalt	mg/kg dw	6.7	8.6	na	na	na	na	na	na
Copper	mg/kg dw	31.4	39.7	na	na	na	na	na	na
Lead	mg/kg dw	10	15	na	na	na	na	na	na
Mercury	mg/kg dw	0.09 J	0.10 J	na	na	na	na	na	na
Molybdenum	mg/kg dw	1 U	0.9 U	na	na	na	na	na	na
Nickel	mg/kg dw	16 J	21 J	na	na	na	na	na	na
Selenium	mg/kg dw	0.9 U	1 U	na	na	na	na	na	na
Silver	mg/kg dw	0.6 U	0.6 U	na	na	na	na	na	na
Thallium	mg/kg dw	0.4 U	0.4 U	na	na	na	na	na	na
Vanadium	mg/kg dw	46.9	60.7	na	na	na	na	na	na
Zinc	mg/kg dw	62	80	na	na	na	na	na	na
PAHs									
1-Methylnaphthalene	µg/kg dw	na	na	na	26	560	4.9 U	na	4.7 U
2-Chloronaphthalene	µg/kg dw	20 U	20 U	na	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	20 U	20 U	na	29	660	4.9 U	na	5.1
Acenaphthene	µg/kg dw	11 J	11 J	na	330	970	4.9 U	na	7.5
Acenaphthylene	µg/kg dw	20 U	20 U	na	15	150	22	na	4.7 U
Anthracene	µg/kg dw	30	31	na	2,000	1,800	30	na	12
Benzo(a)anthracene	µg/kg dw	94	90	na	7,500	3,100	48	na	36
Benzo(a)pyrene	µg/kg dw	86	94	na	4,900	3,200	51	na	42
Benzo(b)fluoranthene	µg/kg dw	87 J	94 J	na	3,900 J	2,200 J	48 J	na	36 J
Benzo(g,h,i)perylene	µg/kg dw	54	46	na	2,200	2,300	68	na	34
Benzo(k)fluoranthene	µg/kg dw	87 J	94 J	na	3,900 J	2,200 J	48 J	na	36 J
Total benzofluoranthenes	µg/kg dw	174 J	188 J	na	7,800 J	4,400 J	96 J	na	72 J
Chrysene	µg/kg dw	150	140	na	7,900	3,800	67	na	51
Dibenzo(a,h)anthracene	µg/kg dw	26	22	na	870	580	15	na	12
Dibenzofuran	µg/kg dw	20 U	11 J	na	120	460	4.9 U	na	4.7 U
Fluoranthene	µg/kg dw	190	230	na	16,000	8,100	100	na	88
Fluorene	µg/kg dw	11 J	11 J	na	300	820	4.9 U	na	4.7
Indeno(1,2,3-cd)pyrene	µg/kg dw	50	45	na	2,000	1,600	41	na	27
Naphthalene	µg/kg dw	20 U	20 U	na	62	1,000	4.9 U	na	4.7 U
Phenanthrene	µg/kg dw	67	94	na	2,600	7,100	30	na	32
Pyrene	µg/kg dw	170	170	na	12,000	7,400	67	na	79
Total HPAHs	µg/kg dw	990 J	1,030 J	na	61,000 J	34,500 J	550 J	na	441 J
Total LPAHs	µg/kg dw	119 J	147 J	na	5,300	11,800	82	na	56
Total cPAHs	µg/kg dw	130 J	140 J	na	7,100 J	4,400 J	76 J	na	61 J
Total PAHs	µg/kg dw	1,110 J	1,170 J	na	66,000 J	46,300 J	640 J	na	497 J
Phthalates									

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS527-010	LDW-SS603-010 [a]	LDW-SS528-010	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS532-010	LDW-SS533-043-comp
Bis(2-ethylhexyl)phthalate	µg/kg dw	320	230	na	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	22	22	na	na	na	na	na	na
Diethyl phthalate	µg/kg dw	15 U	15 U	na	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	15 U	180	na	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	20	37	na	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	20 U	20 U	na	na	na	na	na	na
Other SVOCs									
1,2,4-Trichlorobenzene	µg/kg dw	6.2 U	6.1 U	na	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	6.2 U	6.1 U	na	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	20 U	20 U	na	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	6.2 U	6.1 U	na	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	99 U	99 U	na	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	99 U	99 U	na	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	99 U	99 U	na	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	6.2 U	6.1 U	na	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	200 UJ	200 UJ	na	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	99 U	99 U	na	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	99 U	99 U	na	na	na	na	na	na
2-Chlorophenol	µg/kg dw	20 U	20 U	na	na	na	na	na	na
2-Methylphenol	µg/kg dw	6.2 U	6.1 U	na	na	na	na	na	na
2-Nitroaniline	µg/kg dw	99 U	99 U	na	na	na	na	na	na
2-Nitrophenol	µg/kg dw	99 U	99 U	na	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	99 UJ	99 UJ	na	na	na	na	na	na
3-Nitroaniline	µg/kg dw	99 U	99 U	na	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	200 U	200 U	na	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	20 U	20 U	na	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	99 U	99 U	na	na	na	na	na	na
4-Chloroaniline	µg/kg dw	99 UJ	99 UJ	na	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	20 U	20 U	na	na	na	na	na	na
4-Methylphenol	µg/kg dw	20 U	20 U	na	na	na	na	na	na
4-Nitroaniline	µg/kg dw	99 U	99 U	na	na	na	na	na	na
4-Nitrophenol	µg/kg dw	99 U	99 U	na	na	na	na	na	na
Aniline	µg/kg dw	20 UJ	20 UJ	na	na	na	na	na	na
Benzoic acid	µg/kg dw	48 J	62 J	na	na	na	na	na	na
Benzyl alcohol	µg/kg dw	20 U	20 U	na	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	20 U	20 U	na	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	20 U	20 U	na	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	20 U	20 U	na	na	na	na	na	na
Carbazole	µg/kg dw	20 U	11 J	na	na	na	na	na	na
Hexachlorobenzene	µg/kg dw	6.2 UJ	6.1 UJ	na	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	6.2 U	6.1 U	na	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	99 UJ	99 UJ	na	na	na	na	na	na
Hexachloroethane	µg/kg dw	20 U	20 U	na	na	na	na	na	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS527-010	LDW-SS603-010 [a]	LDW-SS528-010	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS532-010	LDW-SS533-043-comp
Isophorone	µg/kg dw	20 U	20 U	na	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	31 U	30 U	na	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	31 U	30 U	na	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	6.2 UJ	6.1 UJ	na	na	na	na	na	na
Nitrobenzene	µg/kg dw	20 U	20 U	na	na	na	na	na	na
Pentachlorophenol	µg/kg dw	31 U	30 U	na	na	na	na	na	na
Phenol	µg/kg dw	21	20	na	na	na	na	na	na
PCBs									
Aroclor-1016	µg/kg dw	4.0 U	4.0 U	na	19 U	31 U	3.9 U	na	20 U
Aroclor-1221	µg/kg dw	4.0 U	4.0 U	na	19 U	31 U	3.9 U	na	20 U
Aroclor-1232	µg/kg dw	4.0 U	4.0 U	na	19 U	31 U	3.9 U	na	20 U
Aroclor-1242	µg/kg dw	4.0 U	4.0 U	na	19 U	31 U	3.9 U	na	20 U
Aroclor-1248	µg/kg dw	23	23	na	290 U	320	4.9 U	na	75
Aroclor-1254	µg/kg dw	37	35	na	860	390	11	na	140
Aroclor-1260	µg/kg dw	31	20	na	150 U	150	10	na	64
Aroclor-1262	µg/kg dw	4.0 U	4.0 U	na	19 U	31 U	3.9 U	na	20 U
Aroclor-1268	µg/kg dw	4.0 UJ	4.0 UJ	na	19 UJ	31 UJ	3.9 UJ	na	20 UJ
Total PCBs	µg/kg dw	91	78	na	860	860	21	na	280
Dioxin/furan									
2,3,7,8-TCDD	ng/kg dw	0.306 J	na	0.790 J	0.459	1.77	0.126 U	0.197 J	0.403
1,2,3,7,8-PeCDD	ng/kg dw	0.706 J	na	2.89 J	1.53	7.19	0.354 J	0.524 J	1.22
1,2,3,4,7,8-HxCDD	ng/kg dw	1.12 J	na	5.00 J	2.47	10.6	0.544 J	0.744 J	1.88
1,2,3,6,7,8-HxCDD	ng/kg dw	3.98 J	na	16.2	8.11	39.2	1.85	2.60 J	6.10
1,2,3,7,8,9-HxCDD	ng/kg dw	3.65 J	na	14.2	6.80	32.9	1.60	2.27 J	5.30
1,2,3,4,6,7,8-HpCDD	ng/kg dw	98.5	na	357	230	1,030	38.6	62.7	122
OCDD	ng/kg dw	970	na	3,330	2,370	9,590	365	737	980
2,3,7,8-TCDF	ng/kg dw	0.608 J	na	5.54	1.98	5.37	0.410 J	0.765 J	0.998 U
1,2,3,7,8-PeCDF	ng/kg dw	0.329 J	na	2.07 J	1.02	2.21 J	0.212 J	0.357 J	0.541 J
2,3,4,7,8-PeCDF	ng/kg dw	0.763 J	na	5.17	2.06	4.83	0.298 J	0.773 J	1.24
1,2,3,4,7,8-HxCDF	ng/kg dw	2.65 J	na	18.5	5.53	10.8	0.692 J	1.76 J	6.86
1,2,3,6,7,8-HxCDF	ng/kg dw	0.890 J	na	7.39	2.34	5.23	0.369 J	0.745 J	1.78
1,2,3,7,8,9-HxCDF	ng/kg dw	0.0770 J	na	0.340 J	0.146 J	0.365 J	0.981 U	0.0530 U	0.150 J
2,3,4,6,7,8-HxCDF	ng/kg dw	0.660 J	na	3.52 J	1.81	4.86 J	0.293 J	0.604 J	1.22
1,2,3,4,6,7,8-HpCDF	ng/kg dw	17.6	na	65.2	34.2	95.5	6.47	14.0	32.0
1,2,3,4,7,8,9-HpCDF	ng/kg dw	1.36 J	na	7.35	3.25	6.76	0.361 J	0.864 J	3.29
OCDF	ng/kg dw	66.1	na	205	151	303	19.0	43.6	86.2
Total TCDD	ng/kg dw	3.33	na	12.0	12.0	18.1	2.30	3.32	6.20
Total PeCDD	ng/kg dw	5.30 J	na	21.1	18.2	42.9	3.67	4.47 J	9.20
Total HxCDD	ng/kg dw	36.6	na	145	64.8	463	17.6	29.4	47.3
Total HpCDD	ng/kg dw	271	na	892	427	4,510	126	251	242
Total TCDF	ng/kg dw	11.4	na	85.6	34.4	84.5	4.67	16.3	18.1
Total PeCDF	ng/kg dw	11.9	na	90.6	32.2	125	6.97	16.0	28.4
Total HxCDF	ng/kg dw	28.3	na	139	55.5	184	12.3	21.5	60.0

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS527-010	LDW-SS603-010 [a]	LDW-SS528-010	LDW-SS529-041-comp	LDW-SS530-010	LDW-SS531-010-comp	LDW-SS532-010	LDW-SS533-043-comp
Total HpCDF	ng/kg dw	59.9	na	206	128	314	19.4	39.2	108
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	4.10 J	na	17.7 J	8.99 J	35.7 J	1.71 J	2.93 J	6.28 J
Grain size									
Fractional % phi >-1 (>2000 microns)	% dw	1.1	0.4	0.6	24.1	1.7	9.6	1.8	13.1
Fractional % phi -1-0 (1000-2000 microns)	% dw	0.3	2.7	0.8	6.2	3.3	5.7	2.1	4.5
Fractional % phi 0-1 (500-1000 microns)	% dw	0.9	2.1	1.1	15.8	9.2	15.9	2.9	9.9
Fractional % phi 1-2 (250-500 microns)	% dw	1.3	2.4	0.7	24.1	17.8	29.4	7.9	30.6
Fractional % phi 2-3 (125-250 microns)	% dw	2.3	4.6	1.0	11.5	12.4	12.9	12.9	18.1
Fractional % phi 3-4 (62.5-125 microns)	% dw	8.9	12.9	2.5	6.2	14.0	4.6	25.8	7.1
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	18.2	16.9	8.5	2.7	10.8	4.5	20.3	4.5
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	23.2	18.1	31.7	2.4	9.2	3.2	9.4	3.4
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	18.7	15.9	27.5	2.2	7.2	3.5	5.8	2.6
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	11.6	10.1	9.3	1.9	4.9	3.4	3.8	1.7
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	5.0	4.4	5.0	1.1	3.4	2.8	2.7	1.5
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	2.6	3.0	3.4	0.7	2.8	1.8	1.4	1.0
Fractional % phi 10+ (<0.98 micron)	% dw	6.1	6.3	7.9	1.3	3.3	2.7	3.2	2.0
Total gravel	% dw	1.1	0.4	0.6	24.1	1.7	9.6	1.8	13.1
Total sand	% dw	13.7	24.7	6.1	63.8	56.7	68.5	51.6	70.2
Total silt	% dw	71.7	61.0	77.0	9.2	32.1	14.6	39.3	12.2
Total clay	% dw	13.7	13.7	16.3	3.1	9.5	7.3	7.3	4.5
Total fines (percent silt+clay)	% dw	85.4	74.7	93.3	12.3	41.6	21.9	46.6	16.7
Conventionals									
Total organic carbon (TOC)	% dw	2.18	2.43	3.04	1.47	1.56	1.23	2.27	1.40
Total solids	% ww	47.13	47.40	40.80	75.60 J	81.20	73.30	51.30	74.40

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
na - not analyzed
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TEQ - toxic equivalent
U – not detected at reporting limit shown
UJ – not detected at estimated reporting limit shown
ww – wet weight

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS534-010	LDW-SS535-010	LDW-SS536-010	LDW-SS537-010	LDW-SS538-010	LDW-SS539-010	LDW-SS540-010	LDW-SS541-010
Metals									
Antimony	mg/kg dw	na	na	na	na	na	na	na	na
Arsenic	mg/kg dw	na	na	na	na	na	na	na	na
Cadmium	mg/kg dw	na	na	na	na	na	na	na	na
Chromium	mg/kg dw	na	na	na	na	na	na	na	na
Cobalt	mg/kg dw	na	na	na	na	na	na	na	na
Copper	mg/kg dw	na	na	na	na	na	na	na	na
Lead	mg/kg dw	na	na	na	na	na	na	na	na
Mercury	mg/kg dw	na	na	na	na	na	na	na	na
Molybdenum	mg/kg dw	na	na	na	na	na	na	na	na
Nickel	mg/kg dw	na	na	na	na	na	na	na	na
Selenium	mg/kg dw	na	na	na	na	na	na	na	na
Silver	mg/kg dw	na	na	na	na	na	na	na	na
Thallium	mg/kg dw	na	na	na	na	na	na	na	na
Vanadium	mg/kg dw	na	na	na	na	na	na	na	na
Zinc	mg/kg dw	na	na	na	na	na	na	na	na
PAHs									
1-Methylnaphthalene	µg/kg dw	na	na	na	na	na	na	na	na
2-Chloronaphthalene	µg/kg dw	na	na	na	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	na	na	na	na	na	na	na	na
Acenaphthene	µg/kg dw	na	na	na	na	na	na	na	na
Acenaphthylene	µg/kg dw	na	na	na	na	na	na	na	na
Anthracene	µg/kg dw	na	na	na	na	na	na	na	na
Benzo(a)anthracene	µg/kg dw	na	na	na	na	na	na	na	na
Benzo(a)pyrene	µg/kg dw	na	na	na	na	na	na	na	na
Benzo(b)fluoranthene	µg/kg dw	na	na	na	na	na	na	na	na
Benzo(g,h,i)perylene	µg/kg dw	na	na	na	na	na	na	na	na
Benzo(k)fluoranthene	µg/kg dw	na	na	na	na	na	na	na	na
Total benzofluoranthenes	µg/kg dw	na	na	na	na	na	na	na	na
Chrysene	µg/kg dw	na	na	na	na	na	na	na	na
Dibenzo(a,h)anthracene	µg/kg dw	na	na	na	na	na	na	na	na
Dibenzofuran	µg/kg dw	na	na	na	na	na	na	na	na
Fluoranthene	µg/kg dw	na	na	na	na	na	na	na	na
Fluorene	µg/kg dw	na	na	na	na	na	na	na	na
Indeno(1,2,3-cd)pyrene	µg/kg dw	na	na	na	na	na	na	na	na
Naphthalene	µg/kg dw	na	na	na	na	na	na	na	na
Phenanthrene	µg/kg dw	na	na	na	na	na	na	na	na
Pyrene	µg/kg dw	na	na	na	na	na	na	na	na
Total HPAHs	µg/kg dw	na	na	na	na	na	na	na	na
Total LPAHs	µg/kg dw	na	na	na	na	na	na	na	na
Total cPAHs	µg/kg dw	na	na	na	na	na	na	na	na
Total PAHs	µg/kg dw	na	na	na	na	na	na	na	na
Phthalates									

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS534-010	LDW-SS535-010	LDW-SS536-010	LDW-SS537-010	LDW-SS538-010	LDW-SS539-010	LDW-SS540-010	LDW-SS541-010
Bis(2-ethylhexyl)phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Diethyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	na	na	na	na	na	na	na	na
Other SVOCs									
1,2,4-Trichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	na	na	na	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na	na	na
2-Chlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
2-Methylphenol	µg/kg dw	na	na	na	na	na	na	na	na
2-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na	na
2-Nitrophenol	µg/kg dw	na	na	na	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	na	na	na	na	na	na	na	na
3-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	na	na	na	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	na	na	na	na	na	na	na	na
4-Chloroaniline	µg/kg dw	na	na	na	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na	na	na
4-Methylphenol	µg/kg dw	na	na	na	na	na	na	na	na
4-Nitroaniline	µg/kg dw	na	na	na	na	na	na	na	na
4-Nitrophenol	µg/kg dw	na	na	na	na	na	na	na	na
Aniline	µg/kg dw	na	na	na	na	na	na	na	na
Benzoic acid	µg/kg dw	na	na	na	na	na	na	na	na
Benzyl alcohol	µg/kg dw	na	na	na	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	na	na	na	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	na	na	na	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	na	na	na	na	na	na	na	na
Carbazole	µg/kg dw	na	na	na	na	na	na	na	na
Hexachlorobenzene	µg/kg dw	na	na	na	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	na	na	na	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	na	na	na	na	na	na	na	na
Hexachloroethane	µg/kg dw	na	na	na	na	na	na	na	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS534-010	LDW-SS535-010	LDW-SS536-010	LDW-SS537-010	LDW-SS538-010	LDW-SS539-010	LDW-SS540-010	LDW-SS541-010
Isophorone	µg/kg dw	na	na	na	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	na	na	na	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	na	na	na	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	na	na	na	na	na	na	na	na
Nitrobenzene	µg/kg dw	na	na	na	na	na	na	na	na
Pentachlorophenol	µg/kg dw	na	na	na	na	na	na	na	na
Phenol	µg/kg dw	na	na	na	na	na	na	na	na
PCBs									
Aroclor-1016	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1221	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1232	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1242	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1248	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1254	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1260	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1262	µg/kg dw	na	na	na	na	na	na	na	na
Aroclor-1268	µg/kg dw	na	na	na	na	na	na	na	na
Total PCBs	µg/kg dw	na	na	na	na	na	na	na	na
Dioxin/furan									
2,3,7,8-TCDD	ng/kg dw	0.179 J	0.303 U	0.155 J	0.250 J	0.689 J	0.152 U	0.605 J	0.126 J
1,2,3,7,8-PeCDD	ng/kg dw	0.370 J	1.43 J	0.260 J	0.790 J	1.91 J	0.270 J	1.56 J	0.220 J
1,2,3,4,7,8-HxCDD	ng/kg dw	0.630 J	2.26 J	0.375 J	1.27 J	2.39 J	0.389 J	1.92 J	0.354 U
1,2,3,6,7,8-HxCDD	ng/kg dw	2.42 J	6.20	1.17 J	4.93 J	12.1	1.29 J	5.82	1.92 J
1,2,3,7,8,9-HxCDD	ng/kg dw	1.89 J	6.09	1.10 J	3.52 J	9.28	1.12 J	6.91	1.06 J
1,2,3,4,6,7,8-HpCDD	ng/kg dw	59.3	142	25.4	111	361	26.1	96.8	50.7
OCDD	ng/kg dw	632	1,520	262	1,020	4,440	258	769	496
2,3,7,8-TCDF	ng/kg dw	0.389 J	1.23	0.219 J	0.605 J	3.39	0.236 U	1.87	0.269 J
1,2,3,7,8-PeCDF	ng/kg dw	0.231 J	0.617 J	0.107 J	0.339 J	1.56 J	0.135 J	0.712 J	0.119 J
2,3,4,7,8-PeCDF	ng/kg dw	0.505 J	1.53 J	0.215 J	0.726 J	4.38 J	0.246 J	2.15 J	0.287 J
1,2,3,4,7,8-HxCDF	ng/kg dw	2.16 J	4.70 J	0.650 J	2.16 J	16.6	0.834 J	4.19 J	5.57
1,2,3,6,7,8-HxCDF	ng/kg dw	0.578 J	1.97 J	0.244 J	0.849 J	5.40	0.300 J	1.55 J	0.906 J
1,2,3,7,8,9-HxCDF	ng/kg dw	4.80 U	0.0840 U	5.24 U	0.0900 J	0.301 J	5.14 U	0.0930 U	0.0630 J
2,3,4,6,7,8-HxCDF	ng/kg dw	0.472 J	1.40 J	0.197 J	0.771 J	3.26 J	0.258 J	1.35 J	0.391 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	11.4	25.4	4.91 J	22.2	67.6	5.44	17.9	35.1
1,2,3,4,7,8,9-HpCDF	ng/kg dw	0.969 J	2.10 J	0.368 J	1.41 J	7.87	0.393 J	2.18 J	3.06 J
OCDF	ng/kg dw	44.6	87.6	17.1	73.2	234	22.1	56.4	70.3
Total TCDD	ng/kg dw	2.08	3.55	1.16 J	2.59	8.31	0.959 J	9.34	1.04
Total PeCDD	ng/kg dw	2.63	7.85	1.54 J	4.40 J	13.4	2.02 J	13.4	1.21
Total HxCDD	ng/kg dw	21.5	58.0	10.2	39.7	115	11.2	58.9	10.9
Total HpCDD	ng/kg dw	180	515	61.4	293	976	63.7	235	105
Total TCDF	ng/kg dw	6.38	18.3	3.65	10.1	43.2	3.87	36.0	2.83
Total PeCDF	ng/kg dw	8.38	32.5	3.44 J	12.7	57.6	3.65 J	45.5	4.30
Total HxCDF	ng/kg dw	18.5	49.4	7.49	30.9	113	9.27	41.9	34.5

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS534-010	LDW-SS535-010	LDW-SS536-010	LDW-SS537-010	LDW-SS538-010	LDW-SS539-010	LDW-SS540-010	LDW-SS541-010
Total HpCDF	ng/kg dw	39.4	81.0	14.7	65.6	219	18.4	52.1	112
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	2.72 J	6.63 J	1.53 J	4.36 J	15.0 J	1.52 J	6.61 J	2.53 J
Grain size									
Fractional % phi >-1 (>2000 microns)	% dw	1.7	42.3	0.1 U	0.1 U	0.5	0.2	4.1	0.1
Fractional % phi -1-0 (1000-2000 microns)	% dw	2.3	6.5	0.1 U	0.8	1.7	0.6	3.9	0.3
Fractional % phi 0-1 (500-1000 microns)	% dw	12.6	7.9	0.4	7.1	5.9	8.2	7.9	1.4
Fractional % phi 1-2 (250-500 microns)	% dw	36.1	21.8	2.2	16.6	15.4	28.3	11.2	19.4
Fractional % phi 2-3 (125-250 microns)	% dw	10.3	12.1	65.7	13.2	12.4	24.7	10.0	48.5
Fractional % phi 3-4 (62.5-125 microns)	% dw	7.0	2.9	13.8	11.5	10.5	8.7	16.4	9.0
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	7.7	0.5	4.7	7.7	15.1	10.8	15.0	7.1
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	7.0	2.1	4.3	12.1	11.8	6.0	10.2	4.0
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	5.4	0.5	3.3	12.3	9.9	4.3	6.9	3.3
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	3.5	0.9	1.9	7.6	5.7	2.7	5.4	2.4
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	2.0	0.8	0.8	3.7	3.4	1.7	2.8	1.1
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	1.5	0.4	0.7	2.3	2.5	1.1	2.4	1.0
Fractional % phi 10+ (<0.98 micron)	% dw	3.0	1.1	2.0	5.0	5.2	2.7	3.8	2.5
Total gravel	% dw	1.7	42.3	0.1 U	0.1 U	0.5	0.2	4.1	0.1
Total sand	% dw	68.3	51.2	82.1	49.2	45.9	70.5	49.4	78.6
Total silt	% dw	23.6	4.0	14.2	39.7	42.5	23.8	37.5	16.8
Total clay	% dw	6.5	2.3	3.5	11.0	11.1	5.5	9.0	4.6
Total fines (percent silt+clay)	% dw	30.1	6.3	17.7	50.7	53.6	29.3	46.5	21.4
Conventionals									
Total organic carbon (TOC)	% dw	1.72	1.38	1.05	1.54	2.15	1.37	1.45	1.10
Total solids	% ww	64.60	69.00	65.80	54.30	60.10	67.10	58.50	69.90

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight

HPAH – high-molecular-weight polycyclic aromatic hydrocarbon

J – estimated concentration

LPAH – low-molecular-weight polycyclic aromatic hydrocarbon

na - not analyzed

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

TEQ - toxic equivalent

U – not detected at reporting limit shown

UJ – not detected at estimated reporting limit shown

ww – wet weight

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS542-010	LDW-SS543-010	LDW-SS544-010-comp	LDW-SS545-010	LDW-SS546-010	LDW-SS547-010
Metals							
Antimony	mg/kg dw	na	na	na	na	na	na
Arsenic	mg/kg dw	na	na	6.4	na	na	8.3
Cadmium	mg/kg dw	na	na	na	na	na	na
Chromium	mg/kg dw	na	na	na	na	na	na
Cobalt	mg/kg dw	na	na	na	na	na	na
Copper	mg/kg dw	na	na	na	na	na	na
Lead	mg/kg dw	na	na	na	na	na	na
Mercury	mg/kg dw	na	na	na	na	na	na
Molybdenum	mg/kg dw	na	na	na	na	na	na
Nickel	mg/kg dw	na	na	na	na	na	na
Selenium	mg/kg dw	na	na	na	na	na	na
Silver	mg/kg dw	na	na	na	na	na	na
Thallium	mg/kg dw	na	na	na	na	na	na
Vanadium	mg/kg dw	na	na	na	na	na	na
Zinc	mg/kg dw	na	na	na	na	na	na
PAHs							
1-Methylnaphthalene	µg/kg dw	na	na	4.8 U	na	na	4.7 U
2-Chloronaphthalene	µg/kg dw	na	na	na	na	na	na
2-Methylnaphthalene	µg/kg dw	na	na	4.8 U	na	na	4.7 U
Acenaphthene	µg/kg dw	na	na	4.8 U	na	na	4.7 U
Acenaphthylene	µg/kg dw	na	na	4.8 U	na	na	4.7 U
Anthracene	µg/kg dw	na	na	4.8	na	na	11
Benzo(a)anthracene	µg/kg dw	na	na	16	na	na	62
Benzo(a)pyrene	µg/kg dw	na	na	19	na	na	77
Benzo(b)fluoranthene	µg/kg dw	na	na	20 J	na	na	71 J
Benzo(g,h,i)perylene	µg/kg dw	na	na	20	na	na	63
Benzo(k)fluoranthene	µg/kg dw	na	na	20 J	na	na	71 J
Total benzofluoranthenes	µg/kg dw	na	na	40 J	na	na	142 J
Chrysene	µg/kg dw	na	na	23	na	na	92
Dibenzo(a,h)anthracene	µg/kg dw	na	na	5.7	na	na	25
Dibenzofuran	µg/kg dw	na	na	4.8 U	na	na	4.7 U
Fluoranthene	µg/kg dw	na	na	44	na	na	170
Fluorene	µg/kg dw	na	na	4.8 U	na	na	4.7 U
Indeno(1,2,3-cd)pyrene	µg/kg dw	na	na	14	na	na	51
Naphthalene	µg/kg dw	na	na	4.8 U	na	na	4.7 U
Phenanthrene	µg/kg dw	na	na	17	na	na	50
Pyrene	µg/kg dw	na	na	32	na	na	120
Total HPAHs	µg/kg dw	na	na	214 J	na	na	800 J
Total LPAHs	µg/kg dw	na	na	22	na	na	61
Total cPAHs	µg/kg dw	na	na	29 J	na	na	110 J
Total PAHs	µg/kg dw	na	na	236 J	na	na	860 J
Phthalates							

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS542-010	LDW-SS543-010	LDW-SS544-010-comp	LDW-SS545-010	LDW-SS546-010	LDW-SS547-010
Bis(2-ethylhexyl)phthalate	µg/kg dw	na	na	na	na	na	na
Butyl benzyl phthalate	µg/kg dw	na	na	na	na	na	na
Diethyl phthalate	µg/kg dw	na	na	na	na	na	na
Dimethyl phthalate	µg/kg dw	na	na	na	na	na	na
Di-n-butyl phthalate	µg/kg dw	na	na	na	na	na	na
Di-n-octyl phthalate	µg/kg dw	na	na	na	na	na	na
Other SVOCs							
1,2,4-Trichlorobenzene	µg/kg dw	na	na	na	na	na	na
1,2-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na
1,3-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na
1,4-Dichlorobenzene	µg/kg dw	na	na	na	na	na	na
2,4,5-Trichlorophenol	µg/kg dw	na	na	na	na	na	na
2,4,6-Trichlorophenol	µg/kg dw	na	na	na	na	na	na
2,4-Dichlorophenol	µg/kg dw	na	na	na	na	na	na
2,4-Dimethylphenol	µg/kg dw	na	na	na	na	na	na
2,4-Dinitrophenol	µg/kg dw	na	na	na	na	na	na
2,4-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na
2,6-Dinitrotoluene	µg/kg dw	na	na	na	na	na	na
2-Chlorophenol	µg/kg dw	na	na	na	na	na	na
2-Methylphenol	µg/kg dw	na	na	na	na	na	na
2-Nitroaniline	µg/kg dw	na	na	na	na	na	na
2-Nitrophenol	µg/kg dw	na	na	na	na	na	na
3,3'-Dichlorobenzidine	µg/kg dw	na	na	na	na	na	na
3-Nitroaniline	µg/kg dw	na	na	na	na	na	na
4,6-Dinitro-o-cresol	µg/kg dw	na	na	na	na	na	na
4-Bromophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na
4-Chloro-3-methylphenol	µg/kg dw	na	na	na	na	na	na
4-Chloroaniline	µg/kg dw	na	na	na	na	na	na
4-Chlorophenyl phenyl ether	µg/kg dw	na	na	na	na	na	na
4-Methylphenol	µg/kg dw	na	na	na	na	na	na
4-Nitroaniline	µg/kg dw	na	na	na	na	na	na
4-Nitrophenol	µg/kg dw	na	na	na	na	na	na
Aniline	µg/kg dw	na	na	na	na	na	na
Benzoic acid	µg/kg dw	na	na	na	na	na	na
Benzyl alcohol	µg/kg dw	na	na	na	na	na	na
bis(2-chloroethoxy)methane	µg/kg dw	na	na	na	na	na	na
bis(2-chloroethyl)ether	µg/kg dw	na	na	na	na	na	na
bis(2-chloroisopropyl)ether	µg/kg dw	na	na	na	na	na	na
Carbazole	µg/kg dw	na	na	na	na	na	na
Hexachlorobenzene	µg/kg dw	na	na	na	na	na	na
Hexachlorobutadiene	µg/kg dw	na	na	na	na	na	na
Hexachlorocyclopentadiene	µg/kg dw	na	na	na	na	na	na
Hexachloroethane	µg/kg dw	na	na	na	na	na	na

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS542-010	LDW-SS543-010	LDW-SS544-010-comp	LDW-SS545-010	LDW-SS546-010	LDW-SS547-010
Isophorone	µg/kg dw	na	na	na	na	na	na
n-Nitroso-di-n-propylamine	µg/kg dw	na	na	na	na	na	na
n-Nitrosodimethylamine	µg/kg dw	na	na	na	na	na	na
n-Nitrosodiphenylamine	µg/kg dw	na	na	na	na	na	na
Nitrobenzene	µg/kg dw	na	na	na	na	na	na
Pentachlorophenol	µg/kg dw	na	na	na	na	na	na
Phenol	µg/kg dw	na	na	na	na	na	na
PCBs							
Aroclor-1016	µg/kg dw	na	na	3.9 U	na	na	3.9 U
Aroclor-1221	µg/kg dw	na	na	3.9 U	na	na	3.9 U
Aroclor-1232	µg/kg dw	na	na	3.9 U	na	na	3.9 U
Aroclor-1242	µg/kg dw	na	na	3.9 U	na	na	3.9 U
Aroclor-1248	µg/kg dw	na	na	31	na	na	12 U
Aroclor-1254	µg/kg dw	na	na	55	na	na	18
Aroclor-1260	µg/kg dw	na	na	41	na	na	12
Aroclor-1262	µg/kg dw	na	na	3.9 U	na	na	3.9 U
Aroclor-1268	µg/kg dw	na	na	3.9 UJ	na	na	3.9 UJ
Total PCBs	µg/kg dw	na	na	127	na	na	30
Dioxin/furan							
2,3,7,8-TCDD	ng/kg dw	0.351 J	0.205 U	0.606	0.0610 J	0.276 U	0.299 U
1,2,3,7,8-PeCDD	ng/kg dw	0.568 J	0.479 J	0.690 J	0.0700 J	0.546 J	0.942 J
1,2,3,4,7,8-HxCDD	ng/kg dw	0.641 J	0.738 J	0.911 J	0.123 J	0.948 J	1.21
1,2,3,6,7,8-HxCDD	ng/kg dw	2.11 J	2.20 J	2.87	0.197 J	2.77 J	3.61
1,2,3,7,8,9-HxCDD	ng/kg dw	1.96 J	2.20 J	2.73	0.198 J	2.55 J	3.81
1,2,3,4,6,7,8-HpCDD	ng/kg dw	39.5	42.8	60.1	2.77 J	52.3	76.5
OCDD	ng/kg dw	367	373	548	21.5	469	754
2,3,7,8-TCDF	ng/kg dw	0.423 U	0.370 J	0.927 J	0.0740 U	0.693 U	0.859 J
1,2,3,7,8-PeCDF	ng/kg dw	0.238 J	0.181 J	0.414 U	4.51 U	0.238 J	0.350 J
2,3,4,7,8-PeCDF	ng/kg dw	0.424 J	0.328 J	0.948	0.0590 U	0.461 J	0.795 J
1,2,3,4,7,8-HxCDF	ng/kg dw	1.13 J	1.01 J	2.60	0.129 J	0.963 J	1.64
1,2,3,6,7,8-HxCDF	ng/kg dw	0.500 J	0.424 J	1.16	0.0610 J	0.532 J	0.897
1,2,3,7,8,9-HxCDF	ng/kg dw	0.0630 U	0.0440 J	0.102 U	0.0760 J	0.0580 J	0.0710 J
2,3,4,6,7,8-HxCDF	ng/kg dw	0.387 J	0.358 J	0.843 J	0.0740 J	0.463 J	0.843 J
1,2,3,4,6,7,8-HpCDF	ng/kg dw	8.27	8.78	14.0	0.750 J	10.2	14.0
1,2,3,4,7,8,9-HpCDF	ng/kg dw	0.577 J	0.609 J	1.15	0.120 J	0.650 J	0.931
OCDF	ng/kg dw	27.3	32.5	46.0	2.04 J	34.2	53.7
Total TCDD	ng/kg dw	2.14	1.76	4.78	0.122 J	2.37	5.48
Total PeCDD	ng/kg dw	3.79 J	3.35 J	5.70	0.0700 J	3.95 J	7.69
Total HxCDD	ng/kg dw	18.3	19.0	26.7	1.55 J	22.5	34.2
Total HpCDD	ng/kg dw	93.6	105	134	6.44	122	175
Total TCDF	ng/kg dw	6.85	5.70	19.4	0.337 J	7.37	16.1
Total PeCDF	ng/kg dw	8.26	6.18	18.1	0.0640 J	7.20	24.5
Total HxCDF	ng/kg dw	13.8	15.1	27.1	1.35 J	16.2	28.2

Table A-1-3. Results for all chemicals, grain size, and conventional parameters in 2009/2010 LDW surface sediment samples

Chemical	Unit	LDW-SS542-010	LDW-SS543-010	LDW-SS544-010-comp	LDW-SS545-010	LDW-SS546-010	LDW-SS547-010
Total HpCDF	ng/kg dw	25.3	28.7	46.0	2.08 J	30.2	50.1
Dioxin/furan TEQ - mammal (half DL)	ng/kg dw	2.35 J	2.06 J	3.73 J	0.341 J	2.48 J	3.79 J
Grain size							
Fractional % phi >-1 (>2000 microns)	% dw	0.3	0.1 U	0.3	2.0	1.1	1.4
Fractional % phi -1-0 (1000-2000 microns)	% dw	0.6	2.0	1.2	14.8	2.6	1.2
Fractional % phi 0-1 (500-1000 microns)	% dw	1.9	0.9	5.5	41.0	13.2	1.9
Fractional % phi 1-2 (250-500 microns)	% dw	11.9	1.2	14.8	28.1	20.3	8.0
Fractional % phi 2-3 (125-250 microns)	% dw	19.4	6.8	11.7	7.9	8.8	17.9
Fractional % phi 3-4 (62.5-125 microns)	% dw	21.8	15.4	16.8	2.8	15.4	16.5
Fractional % phi 4-5 (31.2-62.5 microns)	% dw	16.9	17.6	13.9	1.2	12.1	12.7
Fractional % phi 5-6 (15.6-31.2 microns)	% dw	9.3	20.9	13.2	0.5	7.1	14.1
Fractional % phi 6-7 (7.8-15.6 microns)	% dw	6.7	15.4	7.4	0.4	5.9	9.5
Fractional % phi 7-8 (3.9-7.8 microns)	% dw	4.2	8.3	4.6	0.4	4.6	6.3
Fractional % phi 8-9 (1.95-3.9 microns)	% dw	2.3	3.4	3.4	0.2	3.5	4.6
Fractional % phi 9-10 (0.98-1.95 microns)	% dw	1.8	2.4	2.2	0.1	2.5	2.5
Fractional % phi 10+ (<0.98 micron)	% dw	2.8	5.7	5.1	0.7	2.9	3.3
Total gravel	% dw	0.3	0.1 U	0.3	2.0	1.1	1.4
Total sand	% dw	55.6	26.3	50.0	94.6	60.3	45.5
Total silt	% dw	37.1	62.2	39.0	2.5	29.7	42.6
Total clay	% dw	6.9	11.5	10.7	1.0	8.9	10.4
Total fines (percent silt+clay)	% dw	44.0	73.7	49.7	3.5	38.6	53.0
Conventionals							
Total organic carbon (TOC)	% dw	1.16	3.64	1.88	1.01	2.60	2.04
Total solids	% ww	62.00	45.40	62.70	77.40	58.90	52.30 J

[a] This is a field duplicate sample of the sample directly preceding it.

dw – dry weight
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
na - not analyzed
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TEQ - toxic equivalent
U – not detected at reporting limit shown
UJ – not detected at estimated reporting limit shown
ww – wet weight

Table A-1-4. Results for OC-normalized SMS chemicals in sample LDW-SS527 and associated field duplicate sample

Analyte	Unit	LDW-SS527-010	LDW-SS603-010 [a]	SQS	CSL
PAHs					
2-Methylnaphthalene	mg/kg OC	0.92 U	0.82 U	38	64
Acenaphthene	mg/kg OC	0.50 J	0.45 J	16	57
Acenaphthylene	mg/kg OC	0.92 U	0.82 U	66	66
Anthracene	mg/kg OC	1.4	1.3	220	1,200
Benzo(a)anthracene	mg/kg OC	4.3	3.7	110	270
Benzo(a)pyrene	mg/kg OC	3.9	3.9	99	210
Benzo(g,h,i)perylene	mg/kg OC	2.5	1.9	31	78
Total benzofluoranthenes	mg/kg OC	7.98 J	7.74 J	230	450
Chrysene	mg/kg OC	6.9	5.8	110	460
Dibenzo(a,h)anthracene	mg/kg OC	1.2	0.91	12	33
Dibenzofuran	mg/kg OC	0.92 U	0.45 J	15	58
Fluoranthene	mg/kg OC	8.7	9.5	160	1,200
Fluorene	mg/kg OC	0.50 J	0.45 J	23	79
Indeno(1,2,3-cd)pyrene	mg/kg OC	2.3	1.9	34	88
Naphthalene	mg/kg OC	0.92 U	0.82 U	99	170
Phenanthrene	mg/kg OC	3.1	3.9	100	480
Pyrene	mg/kg OC	7.8	7.0	1,000	1,400
Total HPAHs	mg/kg OC	45 J	42.4 J	960	5,300
Total LPAHs	mg/kg OC	5.46 J	6.05 J	370	780
Phthalates					
Bis(2-ethylhexyl)phthalate	mg/kg OC	15	9.5	47	78
Butyl benzyl phthalate	mg/kg OC	1.0	0.91	4.9	64
Diethyl phthalate	mg/kg OC	0.69 U	0.62 U	61	110
Dimethyl phthalate	mg/kg OC	0.69 U	7.4	53	53
Di-n-butyl phthalate	mg/kg OC	0.92	1.5	220	1,700
Di-n-octyl phthalate	mg/kg OC	0.92 U	0.82 U	58	4,500
Other SVOCs					
1,2,4-Trichlorobenzene	mg/kg OC	0.28 U	0.25 U	0.81	1.8
1,2-Dichlorobenzene	mg/kg OC	0.28 U	0.25 U	2.3	2.3
1,4-Dichlorobenzene	mg/kg OC	0.28 U	0.25 U	3.1	9.0
Hexachlorobenzene	mg/kg OC	0.28 UJ	0.25 UJ	0.38	2.3
Hexachlorobutadiene	mg/kg OC	0.28 U	0.25 U	3.9	6.2
n-Nitrosodiphenylamine	mg/kg OC	0.28 UJ	0.25 UJ	11	11
PCBs					
Total PCBs	mg/kg OC	4.2	3.2	12	65

[a] This is a field duplicate sample of LDW-SS527-010
CSL – cleanup screening level
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
OC – organic carbon
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SMS – Sediment Management Standards
SQS – sediment quality standards
SVOC – semivolatile organic compound
U – not detected at reporting limit shown
UJ – not detected at estimated reporting limit shown

Table A-1-5. Results for laboratory duplicates for dioxins and furans in 2009/2010 LDW surface sediment samples

Chemical	LDW-SS505-010			LDW-SS520-010			LDW-SS534-010			LDW-SS536-010		
	Original Sample	Laboratory Duplicate Sample	RPD	Original Sample	Laboratory Duplicate Sample	RPD	Original Sample	Laboratory Duplicate Sample	RPD	Original Sample	Laboratory Duplicate Sample	RPD
1,2,3,4,6,7,8-HpCDD	402	382	5	209	182	14	59.4	59.1	1	26.9	23.9	12
1,2,3,4,6,7,8-HpCDF	74.4	72.7	2	38.9	33.5	15	10.7	12.1	12	5.15	4.66	10
1,2,3,4,7,8,9-HpCDF	5.37	5.20	3	2.65	2.43	9	0.757	1.18	44	0.401	0.335	18
1,2,3,4,7,8-HxCDD	3.79	3.98	5	2.49	2.40	4	0.670	0.590	13	0.368	0.383	4
1,2,3,4,7,8-HxCDF	8.61	8.80	2	4.79	4.29	11	**1.56**	**2.75**	**55**	0.662	0.637	4
1,2,3,6,7,8-HxCDD	15.3	14.9	3	8.40	7.71	9	2.42	2.41	0.4	1.14	1.21	6
1,2,3,6,7,8-HxCDF	2.91	2.86	2	2.22	1.77	23	0.522	0.634	19	0.249	0.239	4
1,2,3,7,8,9-HxCDD	11.1	11.2	1	7.80	7.12	9	1.97	1.80	9	1.03	1.16	12
1,2,3,7,8,9-HxCDF	0.223	0.238	7	0.146	0.140 U	nc	4.80 U	4.84 U	nc	5.24 U	5.41 U	nc
1,2,3,7,8-PeCDD	2.12	2.19	3	1.42	1.41	0.7	0.387	0.353	9	0.205 U	0.260	nc
1,2,3,7,8-PeCDF	1.17	1.16	1	0.722 U	0.595	nc	0.234	0.228	3	0.107	0.102 U	nc
2,3,4,6,7,8-HxCDF	2.36	2.31	2	**2.47**	**1.29**	**63**	0.449	0.495	10	0.211	0.184	14
2,3,4,7,8-PeCDF	2.65	2.52	5	1.80	1.38	26	0.450	0.560	22	0.215	0.215	0.0
2,3,7,8-TCDD	0.511	0.558	9	0.378	0.378	0	0.169	0.189	11	0.138	0.171	21
2,3,7,8-TCDF	2.26	2.30	2	1.12	1.23	9	0.452 U	0.389	nc	0.271	0.167	47
OCDD	3,900	3,770	3	1,970	1,850	6	683	580	16	291	233	22
OCDF	330	316	4	151	132	13	43.7	45.5	4	18.2	16.0	13
Total HpCDD	1,130	1,090	4	612	541	12	214	146	38	64.2	58.6	9
Total HpCDF	282	275	3	138	117	16	37.7	41.0	8	15.5	13.8	12
Total HxCDD	141	141	0	76.6	73.3	4	22.9	20.0	14	9.74	10.7	9
Total HxCDF	111	111	0	61.5	54.1	13	17.1	19.8	15	7.84	7.15	9
Total PeCDD	14.5	15.8	9	9.88	9.54	4	2.46	2.79	13	1.51	1.56	3
Total PeCDF	46.1	43.3	6	29.3	26.9	9	8.37	8.38	0.1	3.52	3.35	5
Total TCDD	8.1	8.76	8	4.57	4.98	9	1.59	2.57	47	0.912	1.40	42
Total TCDF	33.5	33.8	1	23.7	21.8	8	6.45	6.30	2	4.05	3.24	22
Dioxin/furan TEQ - mammal (half DL)	14.2	14.0	1	8.43	7.58	11	2.65	2.78	5	1.38	1.53	10

nc - not calculated
RPD - relative percent difference
TEQ - toxicity equivalent
U - not detected at reporting limit shown

ATTACHMENT 2

Field Notes, Collection Forms, and COCs

15 BB
12/~~16~~/2009 S. Replinger

1920
~~0720~~ - Arrive at Diagonal Ave to begin sampling. (beach collection)
(SR)
Crew: S. Replinger] Windward.
C Lorenz
Kym Takasaki (USACE)
Weather: 50s, misty, calm.

SR ~~0~~1925 Prepare to begin sampling at LDW-SS508.

SR ~~0~~1935 Find target location. Coordinates put location just south of pier. Kym directs us to move sampling location south about 20 ft. to be between the two pipes.

SR ~~0~~1945 Begin sampling at LDW-SS508-010.

1957 Finish sampling at LDW-SS508, return to car.

2009 Depart Diagonal avenue for South Park Bridge (location LDW-SS523).

2015 Arrive at LDW-SS523.

2028 Target coordinates place sample in riprap. Relocate sample per Kym's guidance to patch of exposed sediment adjacent to CSO.

15 BB
12/~~16~~/2009 S. Replinger

2030 - Begin sampling at LDW-SS523-010. Collect additional sediment for duplicate sample (LDW-SS601-010).

2039 - Finish sampling and return to car.

2050 — Head to LDW-SS530 (RM 2.7) to continue sampling.

2105 - Arrive at LDW-SS530 (7th Ave S). Call Berit to clarify access issues at site. Locate sample target per Kym.

2123 - Begin sampling at LDW-SS530-010.

2132 - Finish sampling and return to car.

2139 - Head to LDW-SS509 to continue sampling.

2150 - Arrive at T-107 park to sample at LDW-SS509.

2200 - Begin sampling LDW-SS509-010.

2206 - Finish sampling at LDW-SS509. Return to car.

2220 — Depart T-107 park. End of field day.

S. Replinger 12.15.2009

12/16/09 Benit Bergquist

Time	Location	
0730	HI Marina	Prepare for departure at marina
		Sampling crew: Benit Bergquist, Rick Berg, Mike Yarnes
		Oversight: Kym Takasaki
		Boat: Dave Mullins (USACE)
		Weather: overcast, calm
0750		Slight delay - need to adjust bolt on Van Veen
0800		Leave HI and motor to first location
0803	LDW-SS505	Arrive at station
0807		First grab unsuccessful
0810		2nd grab - " debris
		Move boat towards barge
0813		3rd grab
		47.34.00656
		122 20.76326
0830		Motor to next location
0905	LDW-SS528	Slip 4 - Arrive at slip
0912		Successful grab
0924		Motor to next location

Time	Location	
0930	LDW-SS526	Arrive at location
0940		Successful grab
0957		Motor to next location
1001	LDW-SS525	Arrive at location
1008		3 unsuccessful grabs
1015		Successful grab
1029		Motor to next location
1038	LDW-SS519	Barge on target location so will collect sample north of barge. First check distance from target on S end of barge. Barge may move so hold off until tomorrow. Same distance from target N or S of barge
1046		Motor to next location
1053	LDW-SS515	Arrive at location
		Successful grab
1107		Leave location
1112		Motor into Slip 1 to check out access. Barge present
1122	LDW-SS501	Arrive at location

Time	Location	
1123	LDW-SS501	First grab - didn't close
1125		2nd grab - 9 cm
1128		3rd grab debris
1131		4th " debris
1132		5th rock
		6th empty
		Move out from ledge after 6 unsuccessful grabs
1139		Successful grab
1157		Motor back to marina
		Drop Kym off and take a restroom break/lunch
1235		Motor from marina
1245	LDW-SS504	First grab - washed out
1250		2nd grab - OK
1310	LDW-SS506	Arrive at location
1312		Successful grab
	LDW-SS507 ↓	
1333		Arrive at location
1334		Successful grab
		Field duplicate SS602 at this location
1350		Motor to next location
1359	LDW-SS510	Arrive at location

Time	Location	
1402	LDW-SS510	First grab - successful
1416	LDW-SS512	Arrive at location
1417		successful grab
1431	LDW-SS514	successful grab
1440		motor to next location
	LDW-SS519	Barge is gone so we'll attempt this location
1452		Arrive at SS519
1453		Successful grab
1504	LDW-SS516	on location
1506		1st grab - successful
1517		motor to next location
1520	LDW-SS517	on location
1521		Successful grab outfall not visible (high tide)
1528		motor to next location
1534	LDW-SS518	on location
1537		successful grab
1547		motor to next location
1551	LDW-SS521	Successful grab
1557		motor to next location
	LDW-SS522	Slip 3
1614		on location
1616		Successful grab
1629	LDW-SS524	on location
1633		Hydraulics line blew

Time	Location	
1633	LDW-SS524	While attempting to sample, van veen brought to surface ~~and~~ but possibly contaminated w/ hydraulic fluid
1652		Motor back to marina
1702		Arrive at marina and finish for the day.

B. Bergquist
12/16/09

Time	Location	
0740	1st Ave S. Bridge	Crew: Bert Bergquist, Rick Berg, Mike Yarnes
		Motor to LDW-SS524
0745	LDW-SS524	
0751		successful grab
0803		Motor to next location
0808	LDW-SS527	Arrive at location
		At last location, RB and MY cleaned off deck with Alconox and water in case of contamination from hydraulic fluid, prior to collecting sample LDW-SS524-010.
0810		collect rinsate blank LDW-SS527-RB
0817		successful grab
~~0~~		collect FD LDW-SS603-010
0830		Motor to next location
0840	LDW-SS532	First grab under penetrated
0843		second grab successful
0850		motor to next location
0856	LDW-SS-534	First grab - acceptable
0908		motor to next location

weather: overcast calm

Time	Location	
0908	LDW-SS535	Arrive at location
0912		First grab - debris
		2nd grab - stick in jaws
0918		3rd grab - rust-colored cobble
		4th grab - nothing
0921		Will try moving just downstream
0923		5th grab - 10 cm - will keep this and then try one more grab
		Brown, silt to gravel debris no odor
0929		6th grab - acceptable about 20 ft downstream from pipe, same distance from shoreline as target. Use this instead of 5th grab
0938		Motor to next location
0942	LDW-SS536	Arrive at location
0944		First grab - acceptable
0956	LDW-SS537	Arrive at location
1007		Acceptable grab collected
1016		Motor to next location
1020	LDW-SS538	Successful grab
1030		Motor to next location

Time	Location	
1034	LDW-SS539	First grab - washed out
1037		2nd grab - acceptable
1045	LDW-SS540	At location
		Talked to Craig about LDW-SS535. He mapped the coordinates and they are 27 ft from target, to the N. Original target was placed visually near outfall; the sampled location is actually closer or just as close to the outfall, so OK.
1050		First grab - unacceptable
1053		2nd grab - underpenetration
1055		3rd grab - 10 cm - Keep in case but try another
1100		4th grab - unacceptable
1102		5th grab - large debris in jaws
1105		6th grab - acceptable
1110		Motor to Turning Basin Eat lunch and see if we can fit under bridge @ Boeing
11:51		Need about 1 ft more of clearance to get below

Time	Location	
		bridge, so Dave is taking down the davit.
1205	LDW-SS546	Arrive at location Coordinates on land, so location placed away from ledge just off outfall
1210		Acceptable grab collected
1225		Motor to next location. Tide went down so no need to lower davit again to get under bridge.
1235	LDW-SS547	Acceptable grab
1245		Saw bald eagle catch fish from LDW (Turning Basin area) and is feeding on west shore
1252	LDW-SS545	Successful grab collected
1302		Motor to next location
1307	LDW-SS543	acceptable grab collected
1315		Motor to next location
1326	LDW-SS542	First grab - acceptable
1336		Motor to next location
1339	LDW-SS541	acceptable grab collected
1346		Motor to next location
1408		Arrive in Slip 1

Time	Location	
1410	LDW-SS513	First grab - acceptable
1419		Motor to next location
1421	LDW-SS511	Acceptable grab collected
1429		Leave Slip 1. Last sample for the day. Still need one more sample from Slip 2, but waiting for permission to sample.
1445		Arrive at 1st Ave S. Bridge Done for the day.

B. Berggquist

1/11/10

0850 1st Ave Bridge
Crew: Berit Bergquist
Rick Berg
Weather: Rain
Motor to LDW-SS547

0918 LDWSS547
1st grab insufficient penetration
0920 Acceptable grab
0938 Motor to next location
1001 Arrive at LDWSS520
1003 LDWSS520 Successful grab
1020 Arrive back at 1st Ave S Bridge
Sampling complete for day.

B. Bergquist
1/11/01

1/11/10

Time	Location	
1633	LDW-SS502	Crew: Berit Bergquist Suzanne Replinger EPA Oversight: Allison Hiltner Lon Kissinger Weather: overcast Arrive at location and prepare for sampling
1704		Collect sample at LDW-SS502A
1716		Collect sample at LDW-SS502B
1725		collect sample at LDW-SS502C GPS location was located directly in swale, so location was moved slightly south.
1734		collect sample at LDW-SS502-D
1743		collect sample at LDW-SS502-E Location was moved slightly south to be outside of swale
1750		Collect sample at LDW-SS502-F
1759		collect sample at LDW-SS502-G
1805		Collect sample at LDW-SS502-H Return to car to put samples in cooler and get more jars
1828		Collect sample at LDW-SS503-A with auger to 0.45 cm

1842 Collect sample at LDW-SS503-B. Auger could not penetrate to 45cm. Hit a rock at 41 cm, but Allison is ok with that attempt.

1907 collected sample at LDW-SS503-C. Penetration depth was 37 cm.

1915 Collected sample at LDW-SS503-D Penetrated to 45 cm

1926 Collected sample at LDW-SS503-E. Penetrated to 41 cm. Sediment was very wet, so we didn't think we could collect a representative sample placing the auger in the hole a third time (hole was caving in)

1936 Collected sample at LDW-SS503-F to depth of 45 cm

1951 collected sample at LDW-SS503-G to depth of 45 cm

2003 Collected sample at LDW-SS503-H to depth of 45 cm
Head back to car

2056 Arrive at LDW-SS529 and collect first sample from Segment A. We were able

to use option 1. Sampled to 45 cm

2107 Collected sample at LDW-SS529-B to depth of 45 cm

2121 Collected sample at LDW-SS529-D to 45 cm

2133 Collected sample at LDW-SS529-F to 45 cm

2149 Segment towards fence is very rocky and full of debris. Also, water side of segment is underwater. Decide to make another grid between A/B and C/D. OR sample two locations in C and two in D. Proceeding to check it out.
Will select location for H in segment D by throwing a rock to randomly pick low-intertidal location.

2157 Collected sample at LDW-SS529-H at new location to 45 cm depth

2208 Collected sample at LDW-SS529-E to 32 cm

2219 Collected sample at LDW-SS529-C to 45 cm

2231 Selected G by throwing rock in segment C
Collected sample at LDW-SS529G to depth of 45 cm.

2242 done at LDW-SS529
Finished sampling for the day. Return to car.

B. Bergquist
1/11/10

1/12/10 B. Bergquist

1816 Arrive at parking lot.
Field crew: Beir Bergquist
Chelsea Lorenz
Rick Berg
Weather: Rain
Walk to site at LDW-SS544.
Tide is still high so we may not be able to cross the creek to get to the northern segments.
We scoped out alternative crossing route and will have to wait until tide recedes. We decided to sample starting from the southern segments.

1829 Start sampling at LDW-SS544-G
Collect sample from 10 cm depth

1830 Finish collecting sample.
Tide is too high to collect any samples S. of Hamm Creek. It is estimated to be about +2 ft and may not get low enough to sample targeted points

1/12/10 B. Bergquist

even at a 0 ft tide. Called Allison and left message to see if it's OK to move points in towards the shoreline. We decided to go ahead with this because we can't reach Allison and Kym is not here or available yet.

1905 Collect sample at LDW-SS544-H at 10 cm. Sampled as close to water as we could get (planned coordinates was moved).

1914 Collected sample at LDW-SS544-E as close to the water as possible - coordinates were moved.

1926 Collected sample for SS544-F closer to shoreline than targeted coordinates at 10 cm depth

1932 Collected sample LDW-SS544-D at 10 cm, sampled as close to water as we could - coordinates were moved

1/12/10 B. Bergquist

1938 Collected sample LDW-SS544-C @ 10 cm, moved upshore

1947 Collected sample at LDW-SS544B @ 10 cm depth, moved location upshore.

1957 Collected sample at LDW-SS544A at 10 cm. Moved location upshore. Finished at this location

2029 Arrive at LDWSS531

2030 Sample at LDWSS531-G

2037 Sample at LDWSS531-E. All samples at this beach collected at targeted 10 cm depth

2045 Target coordinates placed LDWSS531-C in riprap, so location was sampled at base of riprap.

2050 Sample at LDWSS531-D

2057 Collect sample at LDWSS531-A Very hard substrate so we could only dig a hole down to 7 cm

2104 Collect sample at LDW-SS531-B

1/12/10 B. Bergquist

2110 collected sample at LDW-SS531-F

2115 collected sample at LDW-SS531-H
Finished at this site. Return to car.

2135 Arrive at LDW-SS533

2139 collect sample at LDW-SS533-G at location as far south as we could get and as close to the water, not at targeted location. Substrate was rocky, so we collected a surface sample by hand to a depth of 30cm

2150 collect sample at LDW-SS533H using auger to 45 cm. Location was moved north and towards the shore, because targeted location was covered with water.

2200 Collected sample at LDW-SS533-C to 45 cm

2210 collected sample at LDW-SS533-A to 45cm.

2217 Location SS533-B was moved from target towards shoreline because it was underwater.
Collected sample to depth of 45 cm

2227 collected sample at LDW-SS533-F to 45 cm

2239 collected sample at LDW-SS533-E to 45 cm

2248 Location SS533D is underwater so it was moved to the south to the main part of the beach where human activity most likely to occur
Collected sample at LDW-SS533-D to 45 cm
Finished sampling at this location.
Sampling complete for the day

B. Bergquist
1/12/10

1·13·2010 S. Replinger

1035 - Arrive at LDW-SS531 to re-collect subsample A. Scout sampling location.
Crew: S. Replinger
C. Lorenz
Weather: cloudy, 50s.

1041 - Called Berit to tell her that sampling location target (as previously sampled on 1·12·2010) was under about 2 ft. of water and about 8 ft. from current water edge. Berit advised to collect sample.

1045 - Berit called again to say that she spoke with Kym Takasaki who was ok with moving sample location. to currently exposed area.

1059 - Collect sample from LDW-SS531-010-A. GPS unit was malfunctioning, so sample location marked on aerial map. New location is ~8 ft toward the bank from target.

1110 - Finish sampling

1115 - Depart LDW-SS531. End of field day.

S. Replinger 1·13·2010

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12·15·2009 Weather: 50s, misty

Sampling Method: hand collection Crew: SR, CL

GRAB DATA	Location ID: LDW-SS508			
Latitude: 47.56131		Longitude: 122.34482		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
~~0745~~ 1945	0	10	Y	

SAMPLE DATA	Sample ID: LDW-SS508-010		
Sediment type (%)	Sediment color	Sediment odor	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S
gravel	drab olive	slight	petroleum
sand (F M C)	brown	moderate	other:
silt	gray	strong	
clay	black		

wood debris
organic root debris

GRAB DATA	Location ID: LDW-SS523			
Latitude: 47.54164		Longitude: 122.33503		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments: collect additional sediment for duplicate sample.
2030	0	10	Y	location just above
				CSO in area of
				exposed sediment

SAMPLE DATA	Sample ID: LDW-SS523-010 and LDW-SS601-010		
Sediment type (%)	Sediment color:	Sediment odor:	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S
gravel	drab olive	slight	petroleum
sand (F M C)	brown	moderate	other:
silt trace	gray	strong	
clay	black		

trace shell fragments

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12·15·2009
Weather: 50s, light breeze
Sampling Method: hand collection
Crew: SR, CL

GRAB DATA	Location ID: LDW-SS530			
Latitude: 47.53482		Longitude: 122.32518		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
21:23	0	10	Y	brick, wood, tires, bottles in sampling area.

SAMPLE DATA	Sample ID: LDW-SS530-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	trace shell fragments wood debris
gravel	drab olive	slight	petroleum	
sand (F/M/C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS509			
Latitude: 47.56096		Longitude: 122.35033		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2200	0	10	Y	

SAMPLE DATA	Sample ID: LDW-SS509-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	wood debris some organic matter
gravel	drab olive	slight	petroleum	
sand (F/M/C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/16/09
Weather: overcast
Sampling Method: ~~LDW-SS505~~ single van veen
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS505			
Latitude: 47 34.00656		Longitude: 122 20.76326		
Grab time	Bottom depth ~~(m)~~ ft	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0807	19 ft	0	N	no sediment in grab
0810	19 ft	0	N	debris in grab
0813	30 ft	15	Y	

SAMPLE DATA	Sample ID: LDW-SS505-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel trace	drab olive	slight	petroleum	Shells
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS528			
Latitude: 47.53660		Longitude: 122.31892		
Grab time	Bottom depth ~~(m)~~ ft	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0912	13 ft	20	Y	

SAMPLE DATA	Sample ID: LDW-SS528-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	organic/plant debris
sand (F M C)	brown	moderate	other:	plastic trash bag in
silt	gray	strong		bottom
clay	black			

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/16/09
Weather: overcast/rain
Sampling Method: van veen - single
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS526			
Latitude: 47.53848		Longitude: 122.33038		
Grab time	Bottom depth ~~(m)~~ ft	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0933	8.4 ft	—	N	washed out
0938	8.0 ft	—	N	cobble - no sediment
0940	8.0 ft	13	Y	

SAMPLE DATA	Sample ID: LDW-SS526-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	plant debris, shells, wood fragments
gravel	drab olive	slight	petroleum	
sand (F M C) mostly	brown	moderate	other:	
silt some	gray spots of red	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS525			
Latitude: 47.53925		Longitude: 122.33127		
Grab time	Bottom depth ~~(m)~~ ft or m	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1002	17 ft	—	N	reject - no sediment
1006	2.3 m	—	N	reject
1008	3.1 m	8 cm	N	

SAMPLE DATA	Sample ID: LDW-SS525-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	worm tubes, shell fragments, glass and molten material, sheen pockets
gravel	drab olive	slight	petroleum	
sand (F M C) mostly	brown	moderate	other:	
silt some	gray	strong		
clay	black			

1011	3.7 m	9 cm	N
1015	3.4 m	11 cm	Y

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/16/09
Weather: overcast/rain/wind
Sampling Method: Single van Veen
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS515			
Latitude: 47.55471		Longitude: 122.34118		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1053	3.6	13	Y	

SAMPLE DATA	Sample ID: LDW-SS515-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble and gravel	brown surface	none	H_2S	crab, shells, cobble, plant matter
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray mostly	strong		
clay	black some			

GRAB DATA	Location ID: LDW-SS501			
Latitude: 47.56904		Longitude: 122.34564		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1125	2.9	9 cm	N	
1128	—	—	N	washed out
1131	—	—	N	debris

SAMPLE DATA	Sample ID: LDW-SS501-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	shell fragments, plant debris, sheen pocket, rock flour
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

1132	—	—	N	debris
1134	—	—	N	rock - eel in grab
1137	—	—	N	empty
1139	5.8 m	12 cm	Y	

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/16/09 Weather: overcast, rain

Sampling Method: Single van veen Crew: SB, RB, MY

GRAB DATA	Location ID: LDW-SS504			
Latitude: 47.56736		Longitude: 122.34833		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1245	—	—	N	washed out
1250	19.7	11	Y	

SAMPLE DATA	Sample ID: LDW-SS504-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	shell fragments, pebbles, wood fragments
gravel	drab olive	slight	petroleum	
sand (F M C) top bottom	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS506			
Latitude: 47.56533		Longitude: 122.34645		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1312	13.4	15	Y	

SAMPLE DATA	Sample ID: LDW-SS506-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	Shell fragments, worms
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/16/09
Weather: cloudy, rain off and on
Sampling Method: single van veen
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW- SS507			
Latitude: 47.56311		Longitude: 122.34757		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1334	14.2	20	Y	

SAMPLE DATA	Sample ID: LDW-SS507-010 and LDW-SS602-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	Shell fragments, twigs, black streaks
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		Field duplicate
clay	black			

GRAB DATA	Location ID: LDW-~~SS508~~ SS510			
Latitude: 47.55900		Longitude: 122.34471		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1402	14.0	17	Y	

SAMPLE DATA	Sample ID: LDW-SS510-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	Shells, polychaetes, organic matter
gravel some	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt mostly	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/16/09
Weather: partly cloudy, some rain
Sampling Method: Single van veen
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS512			
Latitude: 47.55607		Longitude: 122.34490		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1417	5.9	13	Y	

SAMPLE DATA	Sample ID: LDW-SS512-010		
Sediment type (%)	Sediment color	Sediment odor	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S slight	Shell fragments, worms
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

GRAB DATA	Location ID: LDW-SS514			
Latitude: 47.55587		Longitude: 122.34736		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1431	3.9	12	Y	

SAMPLE DATA	Sample ID: LDW-SS514-010		
Sediment type (%)	Sediment color:	Sediment odor:	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	Shell fragments, wood fragments,
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/16/09 Weather: cloudy

Sampling Method: single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS519			
Latitude: 47.54766		Longitude: 122.33938		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1453	11.2	20	Y	

SAMPLE DATA	Sample ID: LDW-SS519-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	Sheen pockets, plant matter
gravel	drab olive	slight	petroleum	
sand (F/M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS516			
Latitude: 47.55238		Longitude: 122.34127		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1506	16.4	12	Y	

SAMPLE DATA	Sample ID: LDW-SS516-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	organic matter, plastic piece
gravel	drab olive	slight	petroleum	
sand (F/M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/16/09
Weather: overcast / rain off & on
Sampling Method: Single van veen
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS517			
Latitude: 47.55197		Longitude: 122.34016		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1521	6.2	15	Y	

SAMPLE DATA	Sample ID: LDW-SS517-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel some	drab olive	slight	petroleum	Shell fragments
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS518			
Latitude: 47.54899		Longitude: 122.33974		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1537	13.8	18	Y	

SAMPLE DATA	Sample ID: LDW-SS518-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

(13)

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/16/09 Weather: overcast / showers

Sampling Method: Single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS521			
Latitude: 47.~~5476654616~~ BB	Longitude: 122.~~33938~~ BB 33796			
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1551 BB	~~13.5-11.2~~	20	Y	

SAMPLE DATA	Sample ID: LDW-SS521-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS522			
Latitude: 47.54294	Longitude: 122.33033			
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1616	6.9	20		

SAMPLE DATA	Sample ID: LDW-SS522-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	plant matter
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
~~clay~~ Silty clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/17/09 Weather: overcast

Sampling Method: Single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS524			
Latitude: 47.54155		Longitude: 122.33219		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0751	8.5	18	Y	

SAMPLE DATA	Sample ID:			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	clam, shell fragments
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS527			
Latitude: 47.53831		Longitude: 122.32757		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0817	6.7	20	Y	

SAMPLE DATA	Sample ID: LDW-SS527-010 LDW-SS527-RB and LDW-SS603-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	sheen pockets
gravel some	drab olive	slight	petroleum	rinsate blank and field duplicate
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/17/09 Weather: partly cloudy, calm

Sampling Method: Single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS532			
Latitude: 47.53243		Longitude: 122.31831		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0840	—	—	N	underpenetration
0843	4.0	11	Y	

SAMPLE DATA	Sample ID: LDW-SS532-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	wood chunks, plant matter,
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS534			
Latitude: 47.53106		Longitude: 122.31725		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0856	11	13	Y	

SAMPLE DATA	Sample ID: LDW-SS534-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	many shell fragments, worms
gravel	drab olive	slight	petroleum	sandier on top 2 inches
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/17/09 Weather: partly cloudy, calm

Sampling Method: Single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS535			
Latitude: 47.53002		Longitude: 122.31416		
Grab time ~~0912~~	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0912	–	–	N	debris
0915	–	–	N	stick in jaws
0918	–	–	N	rust colored debris/cobbles

SAMPLE DATA	Sample ID: LDW-SS535-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	glass and other debris
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS536			
Latitude: 47.52865		Longitude: 122.31319		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
0944	8.4	12	Y	

SAMPLE DATA	Sample ID: LDW-SS536-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	plant matter
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

0919	–	–	N	nothing
0923	–	10	Y	
0929	3.7	12	Y	

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/17/09
Weather: partly sunny
Sampling Method: single van veen
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS537			
Latitude: 47.52773		Longitude: 122.31280		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1007	3.5	15	Y	

SAMPLE DATA	Sample ID: LDW-SS537-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	worm tubes
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS538			
Latitude: 47.52758		Longitude: 122.31032		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1020	5.5	14	Y	

SAMPLE DATA	Sample ID: LDW-SS538-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	plant material, shell fragments
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/17/09 Weather: partly sunny

Sampling Method: single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS539			
Latitude: 47.52684		Longitude: 122.30993		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1034	—	—	N	washed out
1037	8.2	13	Y	

SAMPLE DATA	Sample ID: LDW-SS539-010		
Sediment type (%)	Sediment color	Sediment odor	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	worm holes, organic matter, shell fragments
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

GRAB DATA	Location ID: LDW-SS540			
Latitude: 47.52609		Longitude: 122.31016		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1050	—	—	N	
1053	—	—	N	underpenetration
1055	—	10	maybe	will try another

SAMPLE DATA	Sample ID: LDW-SS540-010		
Sediment type (%)	Sediment color:	Sediment odor:	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	plant matter, shell fragments
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

1059	—	—	N	
1102	—	—	N	debris in jaws
1105	2.9	12	Y	keep this one

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/17/09 Weather: Slightly overcast

Sampling Method: Single van Veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS546			
Latitude: 47.51185		Longitude: 122.29753		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1210	3.4	12	Y	

SAMPLE DATA	Sample ID: LDW-SS546-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	black pockets, plant material
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS547			
Latitude: 47.51167		Longitude: 122.30163		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1235	1	17	Y	

SAMPLE DATA	Sample ID: LDW-SS547-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	leaf litter, plant matter, bark chunks
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/17/09 Weather: overcast

Sampling Method: single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS545			
Latitude: 47.51275		Longitude: 122.30178		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1252	5.1	17	Y	

SAMPLE DATA	Sample ID: LDW-SS545-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	Shell fragments, worm tubes, organic matter
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS543			
Latitude: 47.51639		Longitude: 122.30469		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1307	3.3	20	Y	

SAMPLE DATA	Sample ID: LDW-SS543-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	worm tubes
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling Project no.: 04-08-06-29

Date: 12/17/09 Weather: cloudy

Sampling Method: Single van veen Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS542			
Latitude: 47.52278		Longitude: 122.30859		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1326	4.1	19	Y	

SAMPLE DATA	Sample ID: LDW-SS542-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	worm holes
gravel	drab olive	slight	petroleum	
sand (F/M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS541			
Latitude: 47.52540		Longitude: 122.30903		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1339	8.3	11	Y	

SAMPLE DATA	Sample ID: LDW-SS-541-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F/M C)	brown	moderate	other: marine	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 12/17/09
Weather: overcast
Sampling Method: Single Van Veen
Crew: BB, RB, MY

GRAB DATA	Location ID: LDW-SS513			
Latitude: 47.55631		Longitude: 122.33979		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1410	6.6	14	Y	

SAMPLE DATA	Sample ID: LDW-SS513-010			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	Organic material
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS511			
Latitude: 47.55683		Longitude: 122.34115		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1421	11.6	20	Y	

SAMPLE DATA	Sample ID: LDW-SS511-010			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	sheen pockets
sand (F M C)	brown	moderate	other:	worms
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** Rain

Sampling Method: single van veen **Crew:** RB, BB

GRAB DATA	Location ID: LDW-SS547			
Latitude: 47.51139		Longitude: 122.30162		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
9:18	1	—	N	insufficient penetration
9:20	1	19	Y	
SAMPLE DATA	Sample ID: LDW-SS547-010			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	wood debris, neanthes worm
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS520			
Latitude: 47.54742		Longitude: 122.33518		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
10:03	5.2	14	Y	
SAMPLE DATA	Sample ID: LDW-SS520-010			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	organic ~~debris~~ matter
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** overcast

Sampling Method: ~~Power~~-hand collection **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS502-A			
Latitude: 210806		Longitude: 1265730		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1704		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-A			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	organic matter
sand (F M C)	brown	moderate	other:	
silt trace	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS502-B			
Latitude: 210801		Longitude: 1265763		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1716		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-B			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	grass on top, organic matter
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 1/11/10
Weather: overcast
Sampling Method: hand sampling
Crew: SR, BB

GRAB DATA	Location ID: LDW-SS502-C			
Latitude: 210729		Longitude: 1265810		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1725		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-C			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	root matter
sand (F M C)	brown	moderate	other:	
silt trace	gray	strong		
clay cobble	black			

GRAB DATA	Location ID: LDW-SS502-D			
Latitude: 210763		Longitude: 1265800		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1734		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-D			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	Organic matter
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** overcast

Sampling Method: hand sampling **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS502-E			
Latitude: 210671		Longitude: 1265840		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1743		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-E			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	trace organic matter
sand (F M C)	brown	moderate	other:	
silt trace	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS502-F			
Latitude: 210658		Longitude: 1265878		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1750		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-F			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	trace organic matter
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** overcast

Sampling Method: hand sampling - spoon **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS502-G			
Latitude: 210626		Longitude: 1265915		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1759		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-G			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	plant matter
gravel	drab olive	slight	petroleum	shell fragments
sand (F/M/C)	brown	moderate	other:	
silt	gray	strong		
clay	black pockets			

GRAB DATA	Location ID: LDW-SS502-H			
Latitude: 210636		Longitude: 1265931		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1805		10		

SAMPLE DATA	Sample ID: LDW-SS502-010-H			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	wood debris, organic matter, brick fragments
gravel	drab olive	slight	petroleum	
sand (F/M/C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** overcast

Sampling Method: hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS503-A			
Latitude: 210546		Longitude: 1265917		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1828		~~10~~ 45	Y	

SAMPLE DATA	Sample ID: LDW-SS503-045-A			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	Brick fragments
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS503-B			
Latitude: 210581		Longitude: 1265934		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1847		41	Y	

SAMPLE DATA	Sample ID: LDW-SS503-041-B			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	brick fragments
sand (F M C)	brown	moderate	other:	
silt	gray red pockets	strong		
clay	black			

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** overcast

Sampling Method: hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS503-C			
Latitude: 120438		Longitude: 1265918		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1907		37		

SAMPLE DATA	Sample ID: LDW-SS503-037-C		
Sediment type (%)	**Sediment color**	**Sediment odor**	**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	wood debris at bottom of core
gravel	drab olive	slight / petroleum	organic matter
sand (F/M/C)	brown / pockets of red	moderate / other:	shell fragments
silt	gray	strong	
clay	black towards the bottom		

GRAB DATA	Location ID: LDW-SS503-D			
Latitude: 210450		Longitude: 1265959		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1915		45		

SAMPLE DATA	Sample ID: LDW-SS503-045-D		
Sediment type (%)	**Sediment color:**	**Sediment odor:**	**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	wood debris
gravel	drab olive	slight / petroleum	
sand (F/M/C)	brown / rusty red	moderate / other:	
silt	gray	strong	
clay	black		

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SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** Overcast

Sampling Method: hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS503-E			
Latitude: 210394		Longitude: 1265938		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1926		41	Y	

SAMPLE DATA	Sample ID: LDW-SS503-041-E			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel trace	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS503-F			
Latitude: 210398		Longitude: 1265959		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1936		45		

SAMPLE DATA	Sample ID: LDW-SS503-045-F			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S slight	
gravel trace	drab olive	slight	petroleum	wood debris
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** overcast

Sampling Method: hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS503-G			
Latitude: 210224		Longitude: 1265939		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1951		45		

SAMPLE DATA	Sample ID: LDW-SS503-045-G			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	trace shell fragments
gravel trace	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS503-H			
Latitude: 210276		Longitude: 1265967		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2003		45		

SAMPLE DATA	Sample ID: LDW-SS503-045-H			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay on bottom	black			

SURFACE SOIL COLLECTION FORM

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SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** light rain

Sampling Method: hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS529-A			
Latitude: 198832		Longitude: 1272479		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2056		45		
SAMPLE DATA	Sample ID: LDW-SS529-045-A			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S slight	
gravel trace	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS529-B			
Latitude: 198802		Longitude: 1272466		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2107		45		
SAMPLE DATA	Sample ID: LDW-SS529-045-B			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel slight	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other: slight	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** Light rain

Sampling Method: Hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS529-C			
Latitude: 1998013		Longitude: 1272521		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2219		45		
SAMPLE DATA	Sample ID: LDW-SS529-045-C			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS529-G			
Latitude: 1987666		Longitude: 1272533		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2231		29		
SAMPLE DATA	Sample ID: LDW-SS529-029-G			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel lots	drab olive	slight	petroleum	brick fragments
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/11/10 **Weather:** Rain

Sampling Method: hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS529-D			
Latitude: 198730		Longitude: 1272525		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2121		45		

SAMPLE DATA	Sample ID: LDW-SS529-045-D			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	Shell fragments
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt trace	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS529-F			
Latitude: 198697		Longitude: 1272549		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2133		45		

SAMPLE DATA	Sample ID: LDW-SS529-045-F			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/14/10 **Weather:** Light rain

Sampling Method: hand auger **Crew:** SR, BB

GRAB DATA	Location ID: LDW-SS529-H			
Latitude: 198750		Longitude: 1272510		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2157		45		
SAMPLE DATA	Sample ID: LDW-SS529-045-H			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	brick fragments
gravel	drab olive	slight	petroleum	
sand (F M C) trace fine	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS529-E			
Latitude: 198730		Longitude: 1272552		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2208		32		
SAMPLE DATA	Sample ID: LDW-SS529-032-E			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	brick fragments
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

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Project Name:	LDW Dioxin Surface Sediment Sampling	**Project no.:**	04-08-06-29
Date:	1/12/10	**Weather:**	cloudy
Sampling Method:	hand sampling	**Crew:**	BB, RB, CL

GRAB DATA	**Location ID:** LDW-SS531-A			
Latitude: 198353		**Longitude:** 1272320		
Grab time	**Bottom depth (m)**	**Penetration depth (cm)**	**Acceptable grab (Y/N)**	**Comments:**
2057		7		Sample lost
				recollected 01/13/10
SAMPLE DATA	**Sample ID:** LDW-SS531-007-A			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	**Location ID:** LDW-SS531-B			
Latitude: 198356		**Longitude:** 1272373		
Grab time	**Bottom depth (m)**	**Penetration depth (cm)**	**Acceptable grab (Y/N)**	**Comments:**
2104		10		
SAMPLE DATA	**Sample ID:** LDW-SS531-010-B			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	Shell fragments
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** cloudy

Sampling Method: hand sampling **Crew:** CL, BB, RB

GRAB DATA	Location ID: LDW-SS531-C			
Latitude: 198292		Longitude: 1272406		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2045		10		

SAMPLE DATA	Sample ID: LDW-SS531-010-C		
Sediment type (%)	Sediment color	Sediment odor	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

GRAB DATA	Location ID: LDW-SS531-D			
Latitude: 198310		Longitude: 1272418		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2050		10		

SAMPLE DATA	Sample ID: LDW-SS531-010-D		
Sediment type (%)	Sediment color:	Sediment odor:	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	
gravel	drab olive	slight / petroleum	
sand (F M C)	brown w/ orange	moderate / other:	
silt	gray	strong	
clay	black		

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** cloudy

Sampling Method: hand sampling **Crew:** RB, CL, BB

GRAB DATA	Location ID: LDW-SS531-F			
Latitude: 198270		Longitude: 1272445		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2110		10		
SAMPLE DATA	Sample ID: LDW-SS531-010-F			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS531-H			
Latitude: 198254		Longitude: 1272500		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2115		10		
SAMPLE DATA	Sample ID: LDW-SS531-010-H			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	glass
sand (F M C)	brown orange	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

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Project Name: LDW Dioxin Surface Sediment Sampling
Project no.: 04-08-06-29
Date: 1/12/10
Weather: cloudy
Sampling Method: hand sampling
Crew: BB, RB, CL

GRAB DATA	Location ID: LDW-SS531-G			
Latitude: 198223		Longitude: 1272466		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2030		10		

SAMPLE DATA	Sample ID: LDW-SS531-010-G			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	organic matter, plant material
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray some red	strong		
clay	black			

↳ iron staining

GRAB DATA	Location ID: LDW-SS531-E			
Latitude: 198279		Longitude: 1272426		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2037		10		

SAMPLE DATA	Sample ID: LDW-SS531-010-E			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	glass
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

gray and orange layers

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** cloudy

Sampling Method: auger **Crew:** BB, RB, CL

GRAB DATA	Location ID: LDW-SS533-C			
Latitude: 197530		Longitude: 1273228		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2200		45		
SAMPLE DATA	Sample ID: LDW-SS533-045-C			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	Worm tubes
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS533-A			
Latitude: 197600		Longitude: 1273165		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2210		45		
SAMPLE DATA	Sample ID: LDW-SS533-045-A			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown iron staining	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

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Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** partly cloudy

Sampling Method: auger **Crew:** CL, RB, BB

GRAB DATA	Location ID: LDW-SS533-B			
Latitude: 197627		Longitude: 1273167		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2217		45		

SAMPLE DATA	Sample ID: LDW-SS533-045-B		
Sediment type (%)	**Sediment color**	**Sediment odor**	**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S mod
gravel	drab olive	slight	petroleum
sand (F M C) all	brown	moderate	other:
silt	gray	strong	plant debris
clay	black		

GRAB DATA	Location ID: LDW-SS533-F			
Latitude: 197465		Longitude: 1273291		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2227		45		

SAMPLE DATA	Sample ID: LDW-SS533-045-F		
Sediment type (%)	**Sediment color:**	**Sediment odor:**	**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S
gravel	drab olive	slight	petroleum
sand (F M C)	brown	moderate	other:
silt	gray	strong	piece of garbage
clay	black		

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** clear

Sampling Method: hand auger **Crew:** BB, RB, CL

GRAB DATA	Location ID: LDW-SS533-E			
Latitude: 197440		Longitude: 1273303		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2039		45		

SAMPLE DATA	Sample ID: LDW-SS533-045-E		
Sediment type (%)	Sediment color	Sediment odor	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

GRAB DATA	Location ID: LDW-SS533-D			
Latitude: 197447		Longitude: 1273231		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2248		45		

SAMPLE DATA	Sample ID: LDW-SS533-045-D		
Sediment type (%)	Sediment color:	Sediment odor:	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	
gravel	drab olive	slight / petroleum	iron staining
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name:	LDW Dioxin Surface Sediment Sampling	Project no.:	04-08-06-29
Date:	1/12/10	Weather:	cloudy
Sampling Method:	auger and hand	Crew:	CL, RB, BB

GRAB DATA	Location ID: LDW-SS533-G			
Latitude: 197427		Longitude: 1273364		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2139		30		

SAMPLE DATA	Sample ID: LDW-SS533-030-G			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS533-H			
Latitude: 197439		Longitude: 1273337		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
2150		45		

SAMPLE DATA	Sample ID: LDW-SS533-045-H			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** overcast

Sampling Method: hand sampling **Crew:** CL, BB, RB

GRAB DATA	Location ID: LDW-SS544-B			
Latitude: 1920604		Longitude: 1276374		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1947		10		
SAMPLE DATA	Sample ID: LDW-SS544-010-B			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS544-A			
Latitude: 192114		Longitude: 1276311		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1957		10		
SAMPLE DATA	Sample ID: LDW-SS544-010-A			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C) trace	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** overcast, rain

Sampling Method: hand sampling **Crew:** BB, RB, CL

GRAB DATA	Location ID: LDW-SS544-D			
Latitude: 191963		Longitude: 1276376		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1932		10		
SAMPLE DATA	Sample ID: LDW-SS544-D10-D			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS544-C			
Latitude: 191994		Longitude: 1276333		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1938		10		
SAMPLE DATA	Sample ID: LDW-SS544-D10-C			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** overcast, rain

Sampling Method: hand sampling **Crew:** RB, CL, RB

GRAB DATA	Location ID: LDW-SS544-E			
Latitude: 191886		Longitude: 1276331		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1914		10		

SAMPLE DATA	Sample ID: LDW-SS544-010-E			
Sediment type (%)	Sediment color	Sediment odor		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

GRAB DATA	Location ID: LDW-SS544-F			
Latitude: 191914		Longitude: 1276385		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1926		10		

SAMPLE DATA	Sample ID: LDW-SS544-010-F			
Sediment type (%)	Sediment color:	Sediment odor:		Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

SURFACE SOIL COLLECTION FORM

Wind Ward environmental LLC SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1/12/10 **Weather:** Rain, overcast

Sampling Method: hand sampling **Crew:** EL, RB, BB

GRAB DATA	Location ID: LDW-SS544-G			
Latitude: 191772		Longitude: 1276373		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1829		10		

SAMPLE DATA	Sample ID: LDW-SS544-010-G		
Sediment type (%)	Sediment color	Sediment odor	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

GRAB DATA	Location ID: LDW-SS544-H			
Latitude: 191823		Longitude: 1276400		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1907		10		

SAMPLE DATA	Sample ID: LDW-SS544-010-H		
Sediment type (%)	Sediment color:	Sediment odor:	Comments: (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none / H_2S	
gravel	drab olive	slight / petroleum	
sand (F M C)	brown	moderate / other:	
silt	gray	strong	
clay	black		

SURFACE SOIL COLLECTION FORM

Windward environmental LLC

SURFACE SOIL COLLECTION FORM

Project Name: LDW Dioxin Surface Sediment Sampling **Project no.:** 04-08-06-29

Date: 1·13·2010 **Weather:** overcast, 50s

Sampling Method: hand collected **Crew:** SR, CL

GRAB DATA	Location ID: LDW-SS531			
Latitude: 1272319 E		Longitude: 198345 N		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
1059	—	10	Y	Coordinates are approximate because GPS unit not functioning properly.
SAMPLE DATA	Sample ID: LDW-SS531-010-A			
Sediment type (%)	**Sediment color**	**Sediment odor**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	organic debris
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt trace	gray	strong		
clay	black			

GRAB DATA	Location ID:			
Latitude:		Longitude:		
Grab time	Bottom depth (m)	Penetration depth (cm)	Acceptable grab (Y/N)	Comments:
SAMPLE DATA	Sample ID:			
Sediment type (%)	**Sediment color:**	**Sediment odor:**		**Comments:** (i.e. organic matter, wood debris, shell fragments, sheen, fauna, field duplicate, rinsate blank, etc.)
cobble	brown surface	none	H_2S	
gravel	drab olive	slight	petroleum	
sand (F M C)	brown	moderate	other:	
silt	gray	strong		
clay	black			

Beach Composite Sample Checklist

	Location ID	Targeted Depth	River Mile	Location Description	Beach Composite Subsamples							
					A	B	C	D	E	F	G	H
	Beach Composite Samples											
1/11/10	LDW-SS502	0 to 10 cm	0.1 west	Swale area between where the mud starts and where the beach begins	10	→						
1/11/10	LDW-SS503	0 to 45 cm	0.1 west	Beach area as far south as RM 0.2	45	41	37	45	41	45	45	45
1/11/10	LDW-SS529	0 to 45 cm	2.75 east	Entire beach identified on Map 1, plus an additional beach area immediately to the south	45	45	45	45	32	45	29	45
	LDW-SS531	0 to 10 cm	2.8 wets	Park area excluding gravel placement area in the vicinity of the stairs	07	10	→					
	LDW-SS533	0 to 45 cm	3.0 west	Duwamish Waterway Park and the area immediately to the south	45	45	45	45	45	45	30	45
	LDW-SS544	0 to 10 cm	4.5 west	Beach area north of riprap	10	→					10 1829	10

Jar Requirements for each subsample

1 16-oz jar: sediment for compositing by ARI
1 8-oz jar: archive

Note - no lab QC samples, field duplicates, or rinsate blanks are needed

1 of 2

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2783

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, SR

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: Courier
Form filled out by: Marina Mitchell

Shipping Date: 12/17/09
Airbill Number: N/A
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Grain Size (PSEP)	TOC and % solids	16 oz. archive	8 oz. EPA split archive				Comments / Instructions [Jar tag number(s)]
12/15/09	1945	LDW-SS508-010	4	Sediment	X	X	X	X				
	2030	LDW-SS523-010	4		X	X	X	X				
	2030	LDW-SS601-010	~~3~~ 4 mem 12.17.9		X	X	X	~~X~~ ②				xtra volume for GS QC
	2123	LDW-SS530-010	4		X	X	X	X				
	2200	LDW-SS509-010	4		X	X	X	X				
12/16/09	1139	LDW-SS501-010	3		X	X		X				
	1250	LDW-SS504-010	3		X	X		X				
	0813	LDW-SS505-010	3		X	X		X				
	① ~~1313~~	LDW-SS506-010	3		X	X		X				①1312 mem 12.17.09
	1334	LDW-SS507-010	3		X	X		X				
	1402	LDW-SS510-010	3		X	X		X				
	1417	LDW-SS512-010	3		X	X		X				
	~~14~~	Total Number of Containers		Purchase Order / Statement of Work #								

1) Released by: mem 12.16.09	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marina Mitchell		Print name:	
Signature: [signature]	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 12.17.09 @ 1408	Date/Time: 12/17/09 1527	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

② 8 oz. archive NOT collected for LDW-SS601-010 mem 12.17.09

C0000 : 0000

2 of 2 QB99

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2785

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, SR, MY, RB

Ship to: ARI
Attn: Sue Dunnihoo
Shipper:
Form filled out by: Marina Mitchell

Shipping Date: 12/17/09
Airbill Number: n/a
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Grain Size (PSEP)	TOC % Solids	16. oz. archive	8 oz. EPA Split archive				Comments / Instructions [Jar tag number(s)]
12/16/09	1431	LDW-SS514-010	3	Sediment	X	X		X				
	1053	LDW-SS515-010	3		X	X		X				
	1506	LDW-SS516-010	3		X	X		X				
	1521	LDW-SS517-010	3		X	X		X				
	1537	LDW-SS518-010	3		X	X		X				
	1453	LDW-SS519-010	3		X	X		X				
	1551	LDW-SS521-010	3		X	X		X				
	1616	LDW-SS522-010	3		X	X		X				
	1015	LDW-SS525-010	4		X	X	X	X				
	0940	LDW-SS526-010	4		X	X	X	X				
	0912	LDW-SS528-010	3		X	X		X				
	1334	LDW-SS602-010	4		X	X						X-tra volume for grain size (GS) QC
		Total Number of Containers		Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marina Mitchell		Print name:	
Signature: [signature]	Company: ART	Signature:	Company:
Company: Windward		Company:	
Date/Time: 12/17/09 @1408	Date/Time: 12/17/09 1527	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

QB99 : 00003

1 of 2

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2790

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, RB, MY

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: courier-hand
Form filled out by: Marina Mitchell

Shipping Date: 12/18/09
Airbill Number: n/a
Turnaround requested: standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Grain Size (PSEP)	TOC and % solids	8 oz. EPA split archive	16 oz. archive				Comments / Instructions [Jar tag number(s)]
12/17/09	1421	LDW-SS511-010	3	Sediment	X	X	X					
	1410	LDW-SS513-010	3		X	X	X					
	0751	LDW-SS524-010	3		X	X	X					
	0817	LDW-SS527-010	4		X	X	X	X				
	0843	LDW-SS532-010	3		X	X	X					
	0856	LDW-SS534-010	3		X	X	X					
	0929	LDW-SS535-010	3		X	X	X					
	0944	LDW-SS536-010	3		X	X	X					
	1007	LDW-SS537-010	3		X	X	X					
	1020	LDW-SS538-010	3		X	X	X					
	1037	LDW-SS539-010	3		X	X	X					
	1105	LDW-SS540-010	3		X	X	X					
		Total Number of Containers		Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marina Mitchell	Mikka Mulumba	Print name:	
Signature: [signature]	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 12/18/09 @ 1337	Date/Time: 12/18/09 1450	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

00000 : 0000

2 of 2

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2433

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, RB, MY

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: Windward by hand
Form filled out by: Marina Mitchell

Shipping Date: 12/18/09
Airbill Number: n/a
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Grain Size (PSEP)	TOC & % solids	8 oz. EPA split archive	16 oz. archive	SVOCs (8270)	PCBs (8082)	metals (6020/7470)	Comments / Instructions [Jar tag number(s)]
12/17/09	1339	LDW-SS541-010	3	Sediment	X	X	X					
↓	1326	LDW-SS542-010	3	↓	X	X	X					
	1307	LDW-SS543-010	3		X	X	X					
	1252	LDW-SS545-010	3		X	X	X					
	1210	LDW-SS546-010	3		X	X	X					
	1235	LDW-SS547-010	4		X	X	X	X				HOLD until further notice
↓	0817	LDW-SS603-010	3		X	X	X ①	X				
	0810	~~LDW-SS603-RB~~	4	WATER					X	X	X	
		LDW-SS527-RB ^										
		MSM 12-21-09										
		Total Number of Containers		Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marina Mitchell	Nikka Mulumba	Print name:	
Signature: [signature]	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 12/18/09 @ 1337	Date/Time: 12/18/09 1450	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

① An 8-oz. EPA split jar was not collected for LDW-SS603-010 MSM 12-18-09

To be completed by Laboratory upon sample receipt:

Date of receipt:	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

QC19:00003

1 of 5 Qf68

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2793

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, SR, RB

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: courier
Form filled out by: Marina Mitchell

14 MMM 1.13.10
Shipping Date: 1-~~13~~-2010
Airbill Number: N/a
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Grain Size (PSEP)	TOC and % solids	Dioxins @ AXYS	EPA 8oz. Split Archive	16 oz. chemistry archive	8 oz chemistry archive	16 oz for Compositing	Comments / Instructions [Jar tag number(s)]
1/11/10	0920	LDW-SS547-010	① ~~5~~ 8	Sediment	X	X	X	X	X			Compositing
	1003	LDW-SS520-010	② ~~5~~ 4		X	X	X	X	~~X~~ ②			instructions to
	1704	LDW-SS502-010-A	2							X	X	follow - refrigerate
	1716	LDW-SS502-010-B	2							X	X	"16oz. for compositing"
	1725	LDW-SS502-010-C	2							X	X	jars in interim.
	1734	LDW-SS502-010-D	2							X	X	
	1743	LDW-SS502-010-E	2							X	X	Archive the following
	1750	LDW-SS502-010-F	2							X	X	jars Frozen:
	1759	LDW-SS502-010-G	2							X	X	"Dioxins @ AXYS"
	1805	LDW-SS502-010-H	2							X	X	"EPA 8oz. Split"
	1828	LDW-SS503-045-A	2							X	X	"8 oz. chemistry archive"
	1847	LDW-SS503-041-B	2							X	X	"16oz. Chemistry archive"
		Total Number of Containers	32	Purchase Order / Statement of Work #								MMM 1.13.10

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Suzanne Replinger	J. Peterson	Print name:	
Signature: [signature]	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 1.14.2010 / 1150	Date/Time: 1/14/10 1315	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

① Triplicate volume for Grain Size and duplicate volume for chemistry archive provided for lab QC. MMM 1.14.10 ② No 16 oz. chemistry archive for LDW-SS520-010. MMM 1.14.10

QF92 : 00004

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2369

Project/Client Name: Windward Environmental
Project Number: LDW-Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, SR, RB

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: Courier
Form filled out by: Marina Mitchell

Shipping Date: 1-14-2010
Airbill Number: N/a
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): 8 oz. archive	16 oz. for Compositing						Comments / Instructions [Jar tag number(s)]
1/11/10	1907	LDW-SS503-037-C	2	Sediment	X	X						Additional
	1915	LDW-SS503-045-D			X	X						analytical
	1926	LDW-SS503-041-E			X	X						instructions
	1936	LDW-SS503-045-F			X	X						to follow
	1951	LDW-SS503-045-G			X	X						under
	2003	LDW-SS503-045-H			X	X						Seperate
	2056	LDW-SS529-045-A			X	X						Cover.
	2107	LDW-SS529-045-B			X	X						MJM 1-13-10
	2219	LDW-SS529-045-C			X	X						
	2121	LDW-SS529-045-D			X	X						
	2208	LDW-SS529-032-E			X	X						
	2133	LDW-SS529-045-F			X	X						
		Total Number of Containers	24	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Suzanne Replinger	J. Peterson	Print name:	
Signature:	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 1.14.2010/ 1150	Date/Time: 1/14/10 1315	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

01-92 : 00005

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2795

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, SR, RB

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: courier
Form filled out by: Marina Mitchell

Shipping Date: 1-14-10
Airbill Number: n/a
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): 8 oz. Archive	16 oz. for Compositing						Comments / Instructions [Jar tag number(s)]
1/11/10	2231	LDW-SS529-029-G	2	Sediment	X	X						
↓	2157	LDW-SS529_045-H	↓	↓	X	X						
1/13/10	1059	LDW-SS531-010-A	↓	↓	X	X						
1/12/10	2104	LDW-SS531-010-B	↓	↓	X	X						
↓	2045	LDW-SS531-010-C	↓	↓	X	X						
↓	2050	LDW-SS531-010-D	↓	↓	X	X						
↓	2037	LDW-SS531-010-E	↓	↓	X	X						
↓	2110	LDW-SS531-010-F	↓	↓	X	X						
↓	2030	LDW-SS531-010-G	↓	↓	X	X						
↓	2115	LDW-SS531-010-H	↓	↓	X	X						
↓	2210	LDW-SS533-045-A	↓	↓	X	X						
↓	2217	LDW-SS533-045-B	↓	↓	X	X						
		Total Number of Containers	24	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Suzanne Replinger	J. Peterson	Print name:	
Signature: [signature]	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 1·14·2010/1150	Date/Time: 1/14/10 1315	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

QF92 : 00006

4 of 5

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2796

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, RB, SR

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: Courier
Form filled out by: Marina Mitchell

Shipping Date: 1-14-2010
Airbill Number: n/a
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): 8 oz. Archive	16 oz. for Compositing						Comments / Instructions [Jar tag number(s)]
1/12/10	2200	LDW-SS533-045-C	2	Sediment	X	X						
	2248	LDW-SS533-045-D			X	X						
	~~2039~~ ①	LDW-SS533-045-E			X	X						① time = 2239
	2227	LDW-SS533-045-F			X	X						
	2139	LDW-SS533-030-G			X	X						
	2150	LDW-SS533-045-H			X	X						
	1957	LDW-SS544-010-A			X	X						
	1947	LDW-SS544-010-B			X	X						
	1938	LDW-SS544-010-C			X	X						
	1932	LDW-SS544-010-D			X	X						
	1914	LDW-SS544-010-E			X	X						
	1926	LDW-SS544-010-F			X	X						
		Total Number of Containers	24	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Suzanne Replinger	J. Peterson	Print name:	
Signature: [signature]	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 1.14.2010 / 1150	Date/Time: 1/14/10 1315	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

① 2239 mom 1.14.10

QF92:00007

5 of 5

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2797

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, RB, SR

Ship to: ARI
Attn: Sue Dunnihoo
Shipper: Courier
Form filled out by: Marina Mitchell

Shipping Date: 1-14-2010
Airbill Number: n/a
Turnaround requested: Standard

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): 8 oz. Archive	16 oz. for Compositing						Comments / Instructions [Jar tag number(s)]
~~1829~~ ①	1829	LDW-SS544-010-G	2	Sediment	X	X						
~~1907~~ ①	1907	LDW-SS544-010-H	2	↓	X	X						
		Total Number of Containers	4	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Suzanne Replinger	J. Peterson	Print name:	
Signature: [signature]	Company: ARI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 1.14.2010 / 1150	Date/Time: 1/14/10 1315	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt::	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

① Sample Collection Date is 1/12/10. mmc 1-13-10

QF92:00008

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested:	Page: 1 of 1	
ARI Client Company: Windard Env, LLC	Phone:	Date: 1·18·10	Ice Present?
Client Contact: Marina Mitchell		No. of Coolers:	Cooler Temps:
Client Project Name: LDW Dioxin Sampling			
Client Project #:	Samplers:		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Dioxins (Axys)	EPA Split/Freeze Archive	TOC & Total Solids	PSEP Grain Size	Chemistry (Archive)	Extra			Notes/Comments
LDW-SS502-010-comp	1·15·10	14:10	Soil	5	1	1	1	1	1				
LDW-SS503-043-comp	1·15·10	15:30	Soil	5	1	1	1	1	1				
LDW-SS529-041-comp	1·15·10	17:20	Soil	5	1	1	1	1	1				
LDW-SS531-010-comp	1·18·10	10:45	Soil	5	1	1	1	1	1				
LDW-SS533-043-comp	1·18·10	11:58	Soil	5	1	1	1	1	1				
LDW-SS544-010-comp	1·18·10	13:12	Soil	8	1	1	1	3	1	1			

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature) [signature]	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: Brian Reno	Printed Name: Jonathon Walter	Printed Name:	Printed Name:
	Company: ARI Labs	Company: ARI	Company:	Company:
	Date & Time: 1·18·10 & 13:35	Date & Time: 1/18/10 1339	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

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CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2784

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, SR

Ship to: Axys Analytical
Attn: Angela Whefung
Shipper: FedEx
Form filled out by: Marina Mitchell

Shipping Date: 12/21/09
Airbill Number:
Turnaround requested: 6 week

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Dioxins and Furans by EPA 1613							Comments / Instructions [Jar tag number(s)]
12/15/09	1945	LDW-SS508-010	1	Sediment	X				L4065		-1	
	2030	LDW-SS523-010	1		X						-2	
	2123	LDW-SS530-010	1		X						-3	
	2200	LDW-SS509-010	1		X						-4	
12/16/09	1139	LDW-SS501-010	1		X						-5	
	1250	LDW-SS504-010	1		X						-6	
	0813	LDW-SS505-010	1		X						-7	
	① ~~1313~~	LDW-SS506-010	1		X						-8	① 1312 MM 12/17/09
	1334	LDW-SS507-010	1		X						-9	
	1402	LDW-SS510-010	1		X						-10	
	1417	LDW-SS512-010	1		X						-11	
	1431	LDW-SS514-010	1		X						-12	
		Total Number of Containers	12	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marina Mitchell	WKO Cedar	Print name:	
Signature: [signature]	Company: Axys	Signature:	Company:
Company: Windward Env.		Company:	
Date/Time: 12/21/09 @ 11:00	Date/Time: 22/12/09 11:25	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt:	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2786

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BAB, SR, MY, RB

Ship to: Axys Analytical
Attn: Angie Shefting
Shipping Date: 12/21/09
Shipper: Fed Ex
Airbill Number:
Form filled out by: Marina Mitchell
Turnaround requested: 6 week

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Dioxins and Furans by EPA 1613							Comments / Instructions (Jar tag number(s))
					Test(s) Requested (check test(s) required)							
12/16/09	1053	LDW-SS515-010	1	Sediment	X				14065-		13	
	1506	LDW-SS516-010	1		X						-14	
	1521	LDW-SS517-010	1		X						-15	
	1537	LDW-SS518-010	1		X						-16	
	1453	LDW-SS519-010	1		X						-17	
	1551	LDW-SS521-010	1		X						-18	
	1616	LDW-SS522-010	1		X						-19	
	1015	LDW-SS525-010	1		X						-20	
	0940	LDW-SS526-010	1		X						-21	
	0912	LDW-SS528-010	1		X						-22	
12/17/09	1421	LDW-SS511-010	1		X						-23	
	1410	LDW-SS513-010	1		X						-24	
		Total Number of Containers	12	Purchase Order / Statement of Work #								

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marina Mitchell	W.K.O. Cedar	Print name:	
Signature: [signature]	Company: Axys	Signature:	Company:
Company: Windward		Company:	
Date/Time: 12/21/09 @ 11:00	Date/Time: 22/12/09 11:25	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt:	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2787

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marina Mitchell
Sampled By: BTB, RB, MY

Ship to: Axys Analytical
Attn: Angie Whetung
Shipper: Fed Ex
Form filled out by: Marina Mitchell

Shipping Date: 12/21/09
Airbill Number:
Turnaround requested: 6 wks

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Dx/F EPA 1613							Comments / Instructions (Jar tag number(s))
12/17/09	0751	LDW-SS524-010	1	Sediment	X				L40655-25			
	0817	LDW-SS527-010	1		X						-26	
	843	LDW-SS532-010	1		X						-27	
	856	LDW-SS534-010	1		X						-28	
	929	LDW-SS535-010	1		X						-29	
	944	LDW-SS536-010	1		X						-30	
	1007	LDW-SS537-010	1		X						-31	
	1020	LDW-SS538-010	1		X						-32	
	1037	LDW-SS539-010	1		X						-33	
	1105	LDW-SS540-010	1		X						-34	
	1339	LDW-SS541-010	1		X						-35	
	1326	LDW-SS542-010	1		X						-36	
	~~1307~~	**Total Number of Containers**	12	Purchase Order / Statement of Work #								

MEM 12.17.09

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marina Mitchell	UPS Q Cedar	Print name:	
Signature: M Mitchell	Company: Axys	Signature:	Company:
Company: Windward		Company:	
Date/Time: 12/21/09 @ 11:00	Date/Time: 22/12/09 11:25	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt:	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Windward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

4057

4 of 4

CHAIN-OF-CUSTODY/TEST REQUEST FORM

№ 2789

Project/Client Name: Windward Environmental
Project Number: LDW Dioxin Sampling
Contact Name: Marine Mitchell
Sampled By: BMB, MY, RB

Ship to: Axys Analytical
Attn: Angie Whefung
Shipper: FedEx
Form filled out by: M. Mitchell

Shipping Date: 12/21/09
Airbill Number:
Turnaround requested: 6 wk

Sample Collection Date (m/d/y)	Time	Sample Identification	Volume of Sample / # of Containers	Matrix	Test(s) Requested (check test(s) required): Dioxins + Furans (EPA 1613)							Comments / Instructions (Jar tag number(s))
12/17/09	1307	LDW-SS543-010	1	Sediment	X						U4065-37	
	1252	LDW-SS545-010	1		X						-38	
	1210	LDW-SS546-010	1		X						-39	
	1235	LDW-SS547-010	1		X						-40	
		Total Number of Containers	4	Purchase Order / Statement of Work #								

MMSPL 12/18/09

1) Released by:	1) Rec'd by:	2) Released by:	2) Rec'd by:
Print name: Marine Mitchell	WKQ Cedar	Print name:	
Signature: [signature]	Company: AFYI	Signature:	Company:
Company: Windward		Company:	
Date/Time: 12/21/09 @ 11:00	Date/Time: 22/12/09 11:25	Date/Time:	Date/Time:

* Distribution: White copies accompany shipment; yellow retained by consignor.

To be completed by Laboratory upon sample receipt:

Date of receipt:	Laboratory W.O. #:
Condition upon receipt:	Time of receipt:
Cooler temperature:	Received by:

Wind Ward environmental LLC
200 West Mercer Street
Suite 401
Seattle, WA 98119
Tel: (206) 378-1364
Fax: (206) 217-9343

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 01/18/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QF92

4033

Laboratory: AXYS
Lab Contact: Diane Lascniak
Lab Address: 2045 Mills Road W.
Sydney, BC V8L 3S8
Phone: 250-655-5800
Fax:

ARI Client: Windward Environmental, LLC
Project ID: LDW Dioxin Sampling
ARI PM: Sue Dunnihoo
Phone: 206-695-6207
Fax: 206-695-6201

Analytical Protocol: PSDDA
Special Instructions:

Requested Turn Around: **02/01/10**
Fax Results (Y/N): **Email**

Limits of Liability. *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

ARI ID	Client ID/ Add'l ID	Sampled	Matrix	Bottles	Analyses
10-1102-QF92A	LDW-SS502-010-comp L14159-1	01/15/10 14:10	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					
10-1103-QF92B	LDW-SS503-043-comp -2	01/15/10 15:30	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					
10-1104-QF92C	LDW-SS529-041-comp -3	01/15/10 17:20	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					
10-1105-QF92D	LDW-SS531-010-comp -4	01/15/10 10:45	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					
10-1106-QF92E	LDW-SS533-043-comp -5	01/15/10 11:58	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					
10-1107-QF92F	LDW-SS544-010-comp -6	01/18/10 13:12	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					
10-1108-QF92G	LDW-SS547-010 -7	01/11/10 09:20	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					
10-1109-QF92H	LDW-SS520-010 -8	01/11/10 10:03	Sediment	1	Dioxins/Furans 8290 (Su
Special Instructions: None					

Carrier FedEx	Airbill 7931 9301 9597		Date 1/19/2010
Relinquished by Mikka Mulumba	Company ARI	Date 1/19/2010	Time 1232
Received by M. Mash	Company Axys	Date 20-JAN-10	Time 11:00

ATTACHMENT 3

Data Validation Reports

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

April 30, 2010

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed are the revised validation reports for the fractions listed below. These SDGs were received on January 15, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 22400:

SDG #	Fraction
QB98/QC15, QC19 QB99	Semivolatiles, Polychlorinated Biphenyls, Metals, Wet Chemistry

The data validation was performed under EPA Level III & IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005
- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005, Dioxin/Furan Addendum, December 2009
- USEPA, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Data Validation Operations Manager/Senior Chemist

Attachment 1

EDD	LDC #22400 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																				
LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270D)		PCBs (8082)		Metals (200.8 /7000)		TOC (Plumb)		% Solids (160.3)		Part. Size (PSEP)																							
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	QB98/QC15	01/15/10	02/05/10	-	-	-	-	-	-	0	24	0	24	0	24																						
B	QC19	01/15/10	02/05/10	1	0	1	0	1	0	0	6	0	6	0	6																						
C	QB99	01/15/10	02/05/10	-	-	-	-	-	-	0	12	0	12	0	12																						
Total	T/SC			1	0	1	0	1	0	0	42	0	42	0	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	129

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

22400ST.wpd

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22400

Semivolatiles

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 17, 2009
LDC Report Date:	April 29, 2010
Matrix:	Water
Parameters:	Semivolatiles
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QC19

Sample Identification

LDW-SS527-RB
LDW-SS527-RBRE

Introduction

This data review covers 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270D for Semivolatiles.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met with the following exceptions:

Sample	Compound	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
LDW-SS527-RBRE	All TCL compounds	11	7	J (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/24/09	2,4-Dinitrophenol 4-Nitrophenol N-Nitrosodiphenylamine 4-Bromophenyl-phenyl ether	33.3 29.8 33.6 32.8	LDW-SS527-RB MB-122309	J (all detects) UJ (all non-detects)	A
12/29/09	Dibenz(a,h)anthracene	25.8	LDW-SS527-RBRE MB-122809	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were greater than or equal to 0.05 .

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS/D-122309 (LDW-SS527-RB MB-122309)	Aniline	-	0 (28-126)	200 (≤40)	J (all detects) R (all non-detects)	P
LCS/D-122309 (LDW-SS527-RB MB-122309)	N-Nitrosodimethylamine	-	-	47.9 (≤40)	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
LDW-SS527-RB	Benzyl alcohol 4-Chloroaniline 3-Nitroaniline Aniline N-Nitrosodimethylamine	R R R R R	A
LDW-SS527-RBRE	All TCL compounds except Benzyl alcohol 4-Chloroaniline 3-Nitroaniline Aniline N-Nitrosodimethylamine	R	A

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

Sample LDW-SS527-RB was identified as a rinsate blank. No semivolatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Compound	Concentration (ug/L)
LDW-SS527-RB	Benzyl alcohol	8.0
	4-Chloroaniline	60
	3-Nitroaniline	16
	Aniline	55
	N-Nitrosodimethylamine	6.4

Lower Duwamish Waterway Group
Semivolatiles - Data Qualification Summary - SDG QC19

SDG	Sample	Compound	Flag	A or P	Reason
QC19	LDW-SS527-RBRE	All TCL compounds	J (all detects) UJ (all non-detects)	A	Technical holding times
QC19	LDW-SS527-RB	2,4-Dinitrophenol 4-Nitrophenol N-Nitrosodiphenylamine 4-Bromophenyl-phenyl ether	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
QC19	LDW-SS527-RBRE	Dibenz(a,h)anthracene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
QC19	LDW-SS527-RB	Aniline	J (all detects) R (all non-detects)	P	Laboratory control samples (%R)(RPD)
QC19	LDW-SS527-RB	N-Nitrosodimethylamine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (RPD)
QC19	LDW-SS527-RB	Benzyl alcohol 4-Chloroaniline 3-Nitroaniline Aniline N-Nitrosodimethylamine	R R R R R	A	Overall assessment of data
QC19	LDW-SS527-RBRE	All TCL compounds except Benzyl alcohol 4-Chloroaniline 3-Nitroaniline Aniline N-Nitrosodimethylamine	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG QC19

No Sample Data Qualified in this SDG

LDC #: 22400B2

SDG #: QC19

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ III

Date: 2/1/10

Page: 1 of 1

Reviewer: FT

2nd Reviewer: KL

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 12/17/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD, r^2
IV.	Continuing calibration/ICV	SW	ICV ≤ 25
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	client specified
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	~~A~~ N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	D	
XVII.	Field blanks	SW	RB = 1

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: water

1 +	LDW-SS527-RB	11 -	MB - 122309	21		31	
2 -	#1 RE	12 -	MB - 122809	22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU.
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

SDG #: 809

Technical Holding Times

Reviewer: M
2nd Reviewer: M

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MS BNA (EPA SW 846 Method 8270)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
2	water		12/17/09	12/28/09	12/29/09	11	J/UJ/A

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: [illegible]

SDG #: See cover

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1

Reviewer: Ft

2nd Reviewer: [illegible]

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	12/24/09	CCV	HH	33.3		MB - 122309, 1	J/UJ/A
	0758		II	29.8		↓	↓
			QQ	33.6			
			RR	32.8			
			~~SSS~~	~~54.6~~			
	12/29/09	CCV	KKK	25.8		MB - 122809, 2	J/UJ/A
	1156		~~SSS~~	~~36.8~~		↓	↓

SDG #: [illegible]

Surrogate Recovery

Reviewer: F7

2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were percent recoveries (%R) for surrogates within QC limits?

Y N N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

Y N N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		1	TPH	144 (11-132)	no qual
			~~PHL~~	~~38.4 (10-100)~~	↓
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)		QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114	S5 (2FP) = 2-Fluorophenol	25-121	21-100
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116	S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S3 (TPH) = Terphenyl-d14	18-137	33-141	S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S4 (PHL) = Phenol-d5	24-113	10-94	S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 224002

SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of

Reviewer: Ft

2nd Reviewer: A

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a LCS required?

Y N N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS/D-122309	NNN	( )	0 (28-126)	200 (? 40)	MB-122309, 1	J/R/P
			~~OOO~~	( )	( )	47.9 (? 40)		J/UJ P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	~~Sample ID~~ compd	Finding	Associated Samples	Qualifications
		AAA, T, FF, NNN, OOO	possible false detect	1	R/A
		All except above	extracted outside H.T.	2	R/A
		— — — —			

Comments:

OVR.2S

LDC #: [illegible]
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)
Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?
Blank units: ug/L **Associated sample units:** none
Sampling date: 12/11/09
Field blank type: (circle one) Field Blank / Rinsate / Other: RB Associated Samples: none

Compound	Blank ID	Sample Identification								
	1									
~~Diethylphthalate~~ QQQ	8.0									
Di-n-butylphthalate T	60									
~~Bis(2-ethylhexyl)phthalate~~ FF	16									
NNN	55									
OOO	6.4									
CRQL										

Report no associated

Blank units: _____ **Associated sample units:** _____
Sampling date: _____
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								
Diethylphthalate										
Di-n-butylphthalate										
Bis(2-ethylhexyl)phthalate										
CRQL										

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated field blank concentration were qualified as not detected, "U". Other contaminants within five times the field blank concentration were also qualified as not detected, "U".

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22400

Polychlorinated Biphenyls

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 17, 2009
LDC Report Date:	April 29, 2010
Matrix:	Water
Parameters:	Polychlorinated Biphenyls
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QC19

Sample Identification

LDW-SS527-RB

Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

Sample LDW-SS527-RB was identified as a rinsate blank. No polychlorinated biphenyl contaminants were found in this blank.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG QC19

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG QC19

No Sample Data Qualified in this SDG

LDC #: 22400B3b

SDG #: QC19

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ III

Date: 2/1/10

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12/17/09
II.	GC/ECD Instrument Performance Check	NA	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ICV ≤ 20
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client specified
VIII.	Laboratory control samples	A	LCS ID
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	Acceptable Internal stand.
XIV.	Field duplicates	N	
XV.	Field blanks	ND	RB = 1

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

Water

1	LDW-SS527-RB	11	MB-122209	21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22400

Metals

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 17, 2009
LDC Report Date:	April 29, 2010
Matrix:	Water
Parameters:	Metals
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QC19

Sample Identification

LDW-SS527-RB
LDW-SS527-RBMS
LDW-SS527-RBDUP

Introduction

This data review covers 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 and EPA SW 846 Method 7000 for Metals. The metals analyzed were Antimony, Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Molybdenum, Mercury, Nickel, Selenium, Silver, Thallium, Vanadium, and Zinc.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5% .

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

Sample LDW-SS527-RB was identified as a rinsate blank. No metal contaminants were found in this blank.

Lower Duwamish Waterway Group
Metals - Data Qualification Summary - SDG QC19

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
Metals - Laboratory Blank Data Qualification Summary - SDG QC19

No Sample Data Qualified in this SDG

LDC #: 22400B4

VALIDATION COMPLETENESS WORKSHEET

Date: 1-25-10

SDG #: QC19

Level ~~IV~~ III

Page: 1 of 1

Laboratory: Analytical Resources, Inc.

9M4

Reviewer: MG

2nd Reviewer: V

METHOD: Metals (EPA Method 200.8, EPA SW 846 Method 7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12-17-09
II.	ICP/MS Tune	A	
III.	Calibration	A	(CRDL std 70-130)
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	MS
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	ND	RB = 1

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

water

1	LDW-SS527-RB	11		21		31	
2	LDW-SS527-RBMS	12		22		32	
3	LDW-SS527-RBDUP	13		23		33	
4	PBW	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:

LDC #: 22400B4
SDG #: QC19

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MG
2nd reviewer: [illegible]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1	W	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
QC 2,3	↓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
ICP Trace		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
ICP-MS	W	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN-,

Comments: Mercury by CVAA if performed

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22400

Wet Chemistry

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 15 through December 17, 2009
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Wet Chemistry
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	QB98/QC15

Sample Identification

LDW-SS508-010
LDW-SS523-010
LDW-SS601-010
LDW-SS530-010
LDW-SS509-010
LDW-SS501-010
LDW-SS504-010
LDW-SS505-010
LDW-SS506-010
LDW-SS507-010
LDW-SS510-010
LDW-SS512-010
LDW-SS511-010
LDW-SS513-010
LDW-SS524-010
LDW-SS527-010
LDW-SS532-010
LDW-SS534-010
LDW-SS535-010
LDW-SS536-010
LDW-SS537-010
LDW-SS538-010
LDW-SS539-010
LDW-SS540-010
LDW-SS508-010MS
LDW-SS508-010DUP
LDW-SS504-010DUP
LDW-SS504-010TRP
LDW-SS511-010DUP
LDW-SS511-010TRP
LDW-SS527-010DUP
LDW-SS508-010TRP
LDW-SS527-010TRP

Introduction

This data review covers 33 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Plumb Method for Total Organic Carbon, PSEP Method for Particle Size, and EPA Method 160.3 for Percent Solids.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Duplicates/Triplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

Samples LDW-SS523-010 and LDW-SS601-010, samples LDW-SS507-010 and LDW-SS602-010 (from SDG QB99), and samples LDW-SS527-010 and LDW-SS603-010 (from SDG QC19) were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration (%)		RPD
	LDW-SS523-010	LDW-SS601-010	
Total solids	76.70	77.80	1
Total organic carbon	0.982	0.906	8

Phi Size	% Finer		RPD
	LDW-SS601-010	LDW-SS523-010	
-2	96.8	97.7	1
-1	91.3	93.2	2
0	85.6	88.1	3
1	68.3	70.9	4
2	39.4	41.5	5
3	22.2	24.0	8
4	12.3	13.8	11
5	8.4	8.5	1
6	6.6	6.7	2
7	4.9	5.0	2
8	3.4	3.7	8
9	2.2	2.4	9
10	1.1	1.3	17

Analyte	Concentration (%)		RPD
	LDW-SS507-010	LDW-SS602-010	
Total solids	47.20	47.00	0
Total organic carbon	1.79	1.97	10

Phi Size	% Finer		RPD
	LDW-SS602-010	LDW-SS507-010	
-1	100.0	99.6	0
0	98.5	99.0	1
1	96.6	97.9	1
2	94.1	96.4	2
3	90.3	93.2	3
4	84.1	87.1	4
5	75.8	76.6	1
6	62.1	63.8	3
7	45.4	47.4	4
8	31.0	32.6	5
9	20.1	22.2	10
10	12.6	13.8	9

Analyte	Concentration (%)		RPD
	LDW-SS527-010	LDW-SS603-010	
Total solids	46.60	47.40	2
Total organic carbon	2.35	2.43	3

Phi Size	% Finer		RPD
	LDW-SS603-010	LDW-SS527-010	
-1	99.6	98.9	1
0	96.8	98.7	2
1	94.8	97.7	3
2	92.3	96.4	4
3	87.8	94.2	7
4	74.9	85.3	13
5	57.9	67.1	15

Phi Size	% Finer		RPD
	LDW-SS603-010	LDW-SS527-010	
6	39.8	43.9	10
7	23.9	25.2	5
8	13.8	13.7	1
9	9.3	8.7	7
10	6.3	6.1	3

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Wet Chemistry - Data Qualification Summary - SDG QB98/QC15

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG QB98/QC15

No Sample Data Qualified in this SDG

LDC #: 22400A6

SDG #: QB98/QC15

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ III

MG

Date: 1-25-10

Page: 1 of 1

Reviewer: MG

2nd Reviewer: ✓

METHOD: TOC (Plumb Method), Particle Size (PSEP Method), Percent Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12-15-09 through 12-17-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS
V	Duplicates	A	DUP/TRP
VI.	Laboratory control samples	A	LCS
VII.	Sample result verification	N	(SDG: QB99)
VIII.	Overall assessment of data	A	D = 10 + LDW-SS602-010
IX.	Field duplicates	SW	D = 2+3, D = 16 + LDW-SS603-010
X	Field blanks	N	(SDG: QC19)

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:
all sediment

1	LDW-SS508-010	11	LDW-SS510-010	21	LDW-SS537-010	31	LDW-SS527-010DUP
2	LDW-SS523-010	12	LDW-SS512-010	22	LDW-SS538-010	32	LDW-SS508-010 TRP
3	LDW-SS601-010	13	LDW-SS511-010	23	LDW-SS539-010	33	LDW-SS527-010 TRP
4	LDW-SS530-010	14	LDW-SS513-010	24	LDW-SS540-010	34	PBS1
5	LDW-SS509-010	15	LDW-SS524-010	25	LDW-SS508-010MS	35	PBS2
6	LDW-SS501-010	16	LDW-SS527-010	26	LDW-SS508-010DUP	36	PBS3
7	LDW-SS504-010	17	LDW-SS532-010	27	LDW-SS504-010DUP	37	
8	LDW-SS505-010	18	LDW-SS534-010	28	LDW-SS504-010TRP	38	
9	LDW-SS506-010	19	LDW-SS535-010	29	LDW-SS511-010DUP	39	
10	LDW-SS507-010	20	LDW-SS536-010	30	LDW-SS511-010TRP	40	

Notes:

SDG #: QB98/QC15

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of
Reviewer: MG
2nd reviewer: W

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1 → 24	sed	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
QC 25, 26, 31 → 33	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
1 → 24		Moisture Density Porosity Organic Solids Gravity (Particle size) (% solid)
QC 26, 31 → 33		Moisture Density Porosity Organic Solids Gravity Particle size (% solid)
↓ 27 → 30	↓	Moisture Density Porosity Organic Solids Gravity (Particle size)
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size

Comments:

SDG #: QB98/QC15

Field Duplicates

Reviewer: MG
2nd reviewer: ✓

METHOD: Inorganics, Method See cover

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (%)		RPD (Limit)	Difference (Limit)	Qualifier
	2	3			
Total Solids	76.70	77.80	1		
TOC	0.982	0.906	8		

Analyte	Concentration (%)		RPD (Limit)	Difference (Limit)	Qualifier
	10	LDW-SS602-010			
Total Solids	47.20	47.00	0		
TOC	1.79	1.97	10		

Analyte	Concentration (%)		RPD (Limit)	Difference (Limit)	Qualifier
	16	LDW-SS603-010			
Total Solids	46.60	47.40	2		
TOC	2.35	2.43	3		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC#: 22400A6
SDG#: QB98/ QC15

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MG
2nd Reviewer: ✓

Grain Size, Method PSEP

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		RPD	
	3	2		
-2	96.8	97.7	1	
-1	91.3	93.2	2	
0	85.6	88.1	3	
1	68.3	70.9	4	
2	39.4	41.5	5	
3	22.2	24.0	8	
4	12.3	13.8	11	
5	8.4	8.5	1	
6	6.6	6.7	2	
7	4.9	5.0	2	
8	3.4	3.7	8	
9	2.2	2.4	9	
10	1.1	1.3	17	

V:\FIELD DUPLICATES\FD_inorganic\22400A6.wpd

Phi Size	% Finer (%)		RPD	
	LDW-SS602-010	10		
-1	100.0	99.6	0	
0	98.5	99.0	1	
1	96.6	97.9	1	

LDC#: 22400A6
SDG#: QB98/QC15

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MG
2nd Reviewer: ✓

Grain Size, Method PSEP

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		RPD	
	LDW-SS602-010	10		
2	94.1	96.4	2	
3	90.3	93.2	3	
4	84.1	87.1	4	
5	75.8	76.6	1	
6	62.1	63.8	3	
7	45.4	47.4	4	
8	31.0	32.6	5	
9	20.1	22.2	10	
10	12.6	13.8	9	

V:\FIELD DUPLICATES\FD_inorganic\22400A6.wpd

Phi Size	% Finer (%)		RPD	
	LDW-SS603-010	16		
-1	99.6	98.9	1	
0	96.8	98.7	2	
1	94.8	97.7	3	
2	92.3	96.4	4	
3	87.8	94.2	7	
4	74.9	85.3	13	
5	57.9	67.1	15	

LDC#: 22400A6
SDG#: QB98/QC15

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MG
2nd Reviewer: V

Grain Size, Method PSEP

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		RPD	
	LDW-SS603-010	16		
6	39.8	43.9	10	
7	23.9	25.2	5	
8	13.8	13.7	1	
9	9.3	8.7	7	
10	6.3	6.1	3	

V:\FIELD DUPLICATES\FD_inorganic\22400A6.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 17, 2009
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Wet Chemistry
Validation Level:	EPA Level IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	QC19

Sample Identification

LDW-SS541-010
LDW-SS542-010
LDW-SS543-010
LDW-SS545-010
LDW-SS546-010
LDW-SS603-010

Introduction

This data review covers 6 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Plumb Method for Total Organic Carbon, PSEP Method for Particle Size, and EPA Method 160.3 for Percent Solids.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates/Triplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Sample Result Verification

All sample result verifications were acceptable.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

Samples LDW-SS603-010 and LDW-SS527-010 (from SDG QB98/QC15) were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration (%)		RPD
	LDW-SS603-010	LDW-SS527-010	
Total solids	47.40	46.60	2
Total organic carbon	2.43	2.35	3

Phi Size	% Finer		RPD
	LDW-SS603-010	LDW-SS527-010	
-1	99.6	98.9	1
0	96.8	98.7	2
1	94.8	97.7	3
2	92.3	96.4	4
3	87.8	94.2	7
4	74.9	85.3	13
5	57.9	67.1	15
6	39.8	43.9	10
7	23.9	25.2	5
8	13.8	13.7	1
9	9.3	8.7	7
10	6.3	6.1	3

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Wet Chemistry - Data Qualification Summary - SDG QC19

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG QC19

No Sample Data Qualified in this SDG

LDC #: 22400B6

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 1-25-10

SDG #: QC19

Page: 1 of 1

Laboratory: Analytical Resources, Inc.

Reviewer: MG

2nd Reviewer: V

METHOD: TOC (Plumb Method), Particle Size (PSEP Method), Percent Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12-17-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	not required
V	Duplicates	A	DUP/TRP (SDG: QC15)
VI.	Laboratory control samples	A	LCS
VII.	Sample result verification	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D=6 + LDW-SS527-010 (SDG: QB98/QC15)
X.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: all sediment

1	LDW-SS541-010	11		21		31	
2	LDW-SS542-010	12		22		32	
3	LDW-SS543-010	13		23		33	
4	LDW-SS545-010	14		24		34	
5	LDW-SS546-010	15		25		35	
6	LDW-SS603-010	16		26		36	
NA 7	~~LDW-SS545-010DUP~~	17		27		37	
8	PBS	18		28		38	
9		19		29		39	
10		20		30		40	

Notes:

LDC #: 22400B6
SDG #: QC19

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: ✓

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil Water.		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 22400B6
SDG #: QC19

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: ✓

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

SDG #: QC19

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: MG
2nd reviewer: ✓

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1→6	sed	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
1→6	↓	Moisture Density Porosity Organic Solids Gravity (Particle size) (% solid)
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size

Comments:

SDG #: QC19

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Reviewer: MG

2nd reviewer: ✓

METHOD: Inorganics, Method See cover

Y N N/A Were field duplicate pairs identified in this SDG?

Y N N/A Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (%)		RPD (Limit)	Difference (Limit)	Qualifier
	6	LDW-SS527-010			
Total Solids	47.40	46.60	2		
TOC	2.43	2.35	3		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC#: 22400B6
SDG#: QC19

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: MG
2nd Reviewer: ✓

Grain Size, Method PSEP

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		RPD	
	6	LDW-SS527-010		
-1	99.6	98.9	1	
0	96.8	98.7	2	
1	94.8	97.7	3	
2	92.3	96.4	4	
3	87.8	94.2	7	
4	74.9	85.3	13	
5	57.9	67.1	15	
6	39.8	43.9	10	
7	23.9	25.2	5	
8	13.8	13.7	1	
9	9.3	8.7	7	
10	6.3	6.1	3	

V:\FIELD DUPLICATES\FD_inorganic\22400B6.wpd

LDC #: 22400B6
SDG #: QC19

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of TOC was recalculated. Calibration date: 1-4-10

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found / True x 100 Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte		mass C (units)	Area (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	TOC	Blank	0 (µg)	58147	r^2=0.99965	r^2=0.99943	Y
Calibration verification		Standard 1	8 (↓)	1770583			
		Standard 2	20 (↓)	4611982			
		Standard 3	40 (↓)	9454085			
		Standard 4	100 (↓)	24563398			
		Standard 5	–	–			
		Standard 6	–	–			
		Standard 7	–	–			
Calibration verification	TOC	ICV	1014. (mg/L)	1000. (mg/L)	101.4	101.40	↓
Calibration verification	TOC	CCV1	983. (mg/L)	1000. (mg/L)	98.3	98.30	
Calibration verification	–	–	–	–	–	–	–

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22400B6
SDG #: QC19

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Inorganics, Method see cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD		Acceptable (Y/N)
LCS	Laboratory control sample	TOC	0.1014 (%)	0.100 (%)	101.4	101.0		Y
—	Matrix spike sample	—	(SSR-SR) —	—	—	—		—
LD W-SS527-010	Duplicate sample	Total Solids	Trip 1 46.60 (%)	Trip 2 47.50 (%)	Trip 3 47.30 (%)	RSD re-calc 1.0	RSD reported 1.0	Y

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

TOTCLC.6

LDC #: 22400B6
SDG #: QC19

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd reviewer: ✓

METHOD: Inorganics, Method see cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for #1, TOC reported with a positive detect were recalculated and verified using the following equation:

Concentration =
$y = mx + b$
where $m = 246372$
$b = -186465$ (but zero is used)
dil = 1x w/ 2.3 mg burn wt.

Recalculation:
$6078512 = 246372(x\ \mu g C) + 0$
$24.672\ \mu g C = x$ (dry wt)
then $\frac{24.672\ \mu g}{0.0023\ g} = 10727\ \mu g/g$ or mg/kg or 1.07

#	Sample ID	Analyte	Reported Concentration (%)	Calculated Concentration (%)	Acceptable (Y/N)
1	1	Total Solids	69.90	69.91	Y
		TOC	1.10	1.07	
		Particle Size	% finer	% finer	
		4750. (µm)	100.0	100.0	
		2000. ( )	99.9	99.9	
		1000. ( )	99.7	99.7	
		500. ( )	98.3	98.3	
		250. ( )	78.9	78.9	
		125. ( )	30.4	30.4	
		63. ( )	21.3	21.3	
		31.0 ( )	14.2	14.2	
		15.6 ( )	10.3	10.3	
		7.8 ( )	7.0	7.0	
		3.9 ( )	4.6	4.6	
		2.0 ( )	3.4	3.5	
		1.0 ( )	2.5	2.5	

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 16, 2009
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Wet Chemistry
Validation Level:	EPA Level III
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	QB99

Sample Identification

LDW-SS514-010
LDW-SS515-010
LDW-SS516-010
LDW-SS517-010
LDW-SS518-010
LDW-SS519-010
LDW-SS521-010
LDW-SS522-010
LDW-SS525-010
LDW-SS526-010
LDW-SS528-010
LDW-SS602-010
LDW-SS525-010MS
LDW-SS525-010DUP
LDW-SS602-010DUP
LDW-SS602-010TRP
LDW-SS525-010TRP

Introduction

This data review covers 17 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Plumb Method for Total Organic Carbon, PSEP Method for Particle Size, and EPA Method 160.3 for Percent Solids.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Duplicates/Triplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Sample Result Verification

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

Samples LDW-SS602-010 and LDW-SS507-010 (from SDG QB98/QC15) were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration (%)		RPD
	LDW-SS602-010	LDW-SS507-010	
Total solids	47.00	47.20	0
Total organic carbon	1.97	1.79	10

Analyte	% Finer		RPD
	LDW-SS602-010	LDW-SS507-010	
-1	100.0	99.6	0
0	98.5	99.0	1
1	96.6	97.9	1
2	94.1	96.4	2
3	90.3	93.2	3
4	84.1	87.1	4
5	75.8	76.6	1
6	62.1	63.8	3
7	45.4	47.4	4
8	31.0	32.6	5
9	20.1	22.2	10
10	12.6	13.8	9

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Wet Chemistry - Data Qualification Summary - SDG QB99

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG QB99

No Sample Data Qualified in this SDG

LDC #: 22400C6

SDG #: QB99

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ III

Date: 1-25-10

Page: 1 of 1

Reviewer: MG

2nd Reviewer: [illegible]

METHOD: TOC (Plumb Method), Particle Size (PSEP Method), Percent Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12-16-09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS
V	Duplicates	A	DUP/TRP
VI.	Laboratory control samples	A	LCS
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D = 12 + LDW-SS507-010 (SDG: QB98/QC 15)
X	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: all sediment

1	LDW-SS514-010	11	LDW-SS528-010	21		31	
2	LDW-SS515-010	12	LDW-SS602-010	22		32	
3	LDW-SS516-010	13	LDW-SS525-010MS	23		33	
4	LDW-SS517-010	14	LDW-SS525-010DUP	24		34	
5	LDW-SS518-010	15	LDW-SS602-010DUP	25		35	
6	LDW-SS519-010	16	LDW-SS602-010TRP	26		36	
7	LDW-SS521-010	17	LDW-SS525-010TRP	27		37	
8	LDW-SS522-010	18	PBS	28		38	
9	LDW-SS525-010	19		29		39	
10	LDW-SS526-010	20		30		40	

Notes:

SDG #: QB99

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: MG
2nd reviewer: ✓

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1 → 12	sed	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
QC 13	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
↓ 14,17	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
	↓	
1 → 12	↓	Moisture Density Porosity Organic Solids Gravity (Particle size) (% solid)
QC 14,17	↓	Moisture Density Porosity Organic Solids Gravity Particle size (% solid)
↓ 15,16	↓	Moisture Density Porosity Organic Solids Gravity (Particle size)
	↓	Moisture Density Porosity Organic Solids Gravity Particle size
	↓	Moisture Density Porosity Organic Solids Gravity Particle size
	↓	Moisture Density Porosity Organic Solids Gravity Particle size
	↓	Moisture Density Porosity Organic Solids Gravity Particle size
	↓	Moisture Density Porosity Organic Solids Gravity Particle size

Comments:

SDG #: QB99

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MG
2nd reviewer: ✓

METHOD: Inorganics, Method See cover

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (%)		RPD (Limit)	Difference (Limit)	Qualifier
	12	LDW-SS507-010			
Total Solids	47.00	47.20	0		
TOC	1.97	1.79	10		

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

Analyte	Concentration ( )		RPD (Limit)	Difference (Limit)	Qualifier

LDC#: 22400C6
SDG#: QB99

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: MG
2nd Reviewer: N

Grain Size, Method PSEP

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Phi Size	% Finer (%)		RPD	
	12	LDW-SS507-010		
-1	100.0	99.6	0	
0	98.5	99.0	1	
1	96.6	97.9	1	
2	94.1	96.4	2	
3	90.3	93.2	3	
4	84.1	87.1	4	
5	75.8	76.6	1	
6	62.1	63.8	3	
7	45.4	47.4	4	
8	31.0	32.6	5	
9	20.1	22.2	10	
10	12.6	13.8	9	

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

April 30, 2010

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed are the revised validation reports for the fraction listed below. These SDGs were received on February 5, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 22536:

SDG #	**Fraction**
DPWG31717/WG31355	Dioxins/Dibenzofurans
DPWG31752/WG31593	

The data validation was performed under EPA Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005
- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005, Dioxin/Furan Addendum, December 2009
- EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin(PCDD) and Polychlorinated Dibenzofuran(PCDF) Data, Revision 2.0, January 1996
- USEPA, Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Diobenzofurans Data Review, September 2005

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Data Validation Operations Manager/Senior Chemist

V:\LOGIN\Windward\Duwamish\22536COV-R.wpd

Attachment 1

EDD	LDC #22536 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																			PO# Axys07-04
LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (8290)																																
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG31717/WG31355	02/05/10	03/01/10	0	17																															
B	DPWG31752/WG31593	02/09/10	03/01/10	0	10																															
Total	T/SC			0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22536

Dioxins/Dibenzofurans

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 16 through December 17, 2009
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Dioxins/Dibenzofurans
Validation Level:	EPA Level IV
Laboratory:	AXYS Analytical Services Ltd.
Sample Delivery Group (SDG):	DPWG31717/WG31355

Sample Identification

LDW-SS526-010
LDW-SS528-010
LDW-SS511-010
LDW-SS513-010
LDW-SS524-010
LDW-SS527-010
LDW-SS532-010
LDW-SS535-010
LDW-SS536-010
LDW-SS537-010
LDW-SS538-010
LDW-SS539-010
LDW-SS540-010
LDW-SS542-010
LDW-SS543-010
LDW-SS545-010
LDW-SS546-010
LDW-SS536-010DUP

Introduction

This data review covers 18 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1613B for Polychlorinated Dioxins/Dibenzofurans.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) Data (Revision 2.0, January 31, 1996) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between ^{13}C-2,3,7,8-TCDD and ^{13}C-1,2,3,4-TCDD was less than or equal to 25%.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all native compounds and less than or equal to 35.0% for all labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

The minimum S/N ratio was technically acceptable.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration concentrations were within the QC limits.

The ion abundance ratios for all PCDDs and PCDFs were within method criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks.

Method blank results flagged "K" by the laboratory as estimated maximum possible concentration (EMPC) were considered not detected.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Ongoing Precision & Recovery (OPR) and Standard Reference Material (SRM) Samples

Percent recoveries (%R) of the ongoing precision and recovery samples were within QC limits.

Standard reference material samples were analyzed at the required frequency.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG DPWG31717/WG31355	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
All samples in SDG DPWG31717/WG31355	2,3,7,8-TCDF (from DB-5)	R	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Data Qualification Summary - SDG DPWG31717/WG31355

SDG	Sample	Compound	Flag	A or P	Reason
DPWG31717/ WG31355	LDW-SS526-010 LDW-SS528-010 LDW-SS511-010 LDW-SS513-010 LDW-SS524-010 LDW-SS527-010 LDW-SS532-010 LDW-SS535-010 LDW-SS536-010 LDW-SS537-010 LDW-SS538-010 LDW-SS539-010 LDW-SS540-010 LDW-SS542-010 LDW-SS543-010 LDW-SS545-010 LDW-SS546-010 LDW-SS536-010DUP	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A	Compound quantitation and CRQLs (EMPC)
DPWG31717/ WG31355	LDW-SS526-010 LDW-SS528-010 LDW-SS511-010 LDW-SS513-010 LDW-SS524-010 LDW-SS527-010 LDW-SS532-010 LDW-SS535-010 LDW-SS536-010 LDW-SS537-010 LDW-SS538-010 LDW-SS539-010 LDW-SS540-010 LDW-SS542-010 LDW-SS543-010 LDW-SS545-010 LDW-SS546-010 LDW-SS536-010DUP	2,3,7,8-TCDF (from DB-5)	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG DPWG31717/WG31355

No Sample Data Qualified in this SDG

LDC #: 22536A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 2/10/10

SDG #: DPWG31717/WG31355 Level IV Page: 1 of 1

Laboratory: AXYS Analytical Services Ltd. Reviewer: 9

2nd Reviewer: N

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613)B

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12/16 - 12/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	20/35 70
IV.	Routine calibration	A	QC limits
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates /DUP	N/A	<10 DL.
VII.	Laboratory control samples	A	OPR. CRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	SW	
XII.	System performance	A	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	~~D=6~~
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:

All seds

1	1	LDW-SS526-010	11	3	LDW-SS538-010	21	W431355-101	31	
2	1	LDW-SS528-010	12	4	LDW-SS539-010	22		32	
3	1	LDW-SS511-010	13	5	LDW-SS540-010	23		33	
4	2	LDW-SS513-010	14	5	LDW-SS542-010	24		34	
5	1	LDW-SS524-010	15	4	LDW-SS543-010	25		35	
6	1	LDW-SS527-010	16	6	LDW-SS545-010	26		36	
7	1	LDW-SS532-010	17	5	LDW-SS546-010	27		37	
8	3	LDW-SS535-010	18	4	LDW-SS536-010DUP	28		38	
9	3	LDW-SS536-010	19			29		39	
10	4	LDW-SS537-010	20			30		40	

Notes:

DC #: 22536A21
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 3
Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled standards and ≤ 30% for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all ~~percent differences (%D) ≤ 20%~~ meet QC limits for unlabeled standards and ~~≤ 30%~~ for labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP < 10x DL
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

DC #: 2253604
DG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: Q
2nd Reviewer: ✓

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 40-135% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?			✓	
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		

)C #: 22536A-1
)G #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: Q
2nd Reviewer: N

Validation Area	Yes	No	NA	Findings/Comments
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans ~~(EPA SW 846 Method 8290)~~

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 22536A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: R

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method ~~8290~~ 1613)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 1/4/10 **Blank analysis date:** 1/15/10
Conc. units: ng/kg Associated Samples: All

Compound	Blank ID	Sample Identification								
	WG381355-01									
4	EMPC	results	qual	U						

Blank extraction date:_____ **Blank analysis date:**_____
Conc. units:_____ Associated Samples:_____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 22536A2/
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~/613)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	2MPC results		U
		~~#~~	~~#~~		

Comments: See sample calculation verification worksheet for recalculations

COMQUA90.21

LDC #: 22536A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	H on OB-5	All	R/A

Comments:

SDG #: see cover

Initial Calibration Calculation Verification

Reviewer: 9

2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1CA2	11/19/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	0.83	0.83	0.83	2.19	2.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	0.87	0.84	0.84	4.39	4.26
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	0.79	0.78	0.78	1.51	1.45
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	1.07	1.13	1.13	3.27	3.52
			OCDF (^{13}C-OCDD)	0.78	0.78	0.75	0.75	19.8	20.0
2	1CA2	12/23/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	0.92	0.91	0.91	4.69	4.56
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: [illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of 4
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290)~~ 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DXOM-007	1/15/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.5	10.5		
	S=11		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.3	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	54.0	53.8		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	45.3	45.4		
			OCDF (^{13}C-OCDD)	0.78	121	121		
2	DXOM-010	1/25/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.4	10.4		
	S=3		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.0	10.0		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	53.0	52.8		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	44.8	44.9		
			OCDF (^{13}C-OCDD)	0.78	120	120		
3	DXOM-009	1/21/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.6	10.6		
	S=8		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.2	10.2		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	54.8	54.5		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	45.0	45.2		
			OCDF (^{13}C-OCDD)	0.78	120	119		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22536A7
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for th compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DX0M_00T S=1	1/15/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.5	10.5		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.8T	10.1	10.1		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.T9	54.9	54.5		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.0T	44.9	45.1		
			OCDF (^{13}C-OCDD)	0.T8	121	120		
2	DB0B 020 S=3	1/20/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	12.1	12.2		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DX0M_008 S=1	1/20/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.4	10.4		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.8T	10.3	10.2		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.T9	55.5	55.1		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	44.1	44.4		
			OCDF (^{13}C-OCDD)	0.T8	120	120		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22536A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: 9
2nd Reviewer: 11

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~) 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DXCM-011	1/26/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
	S=1		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDD (^{13}C-OCDD)	0.78	11.9	11.9		
2	DB0B_015	1/14/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	11.0	11.1		
	S=2		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DB0B_21	1/20/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	12.4	12.5		
	S=2		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22526B21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: Q
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for th compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DXOM_009	1/21/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.5	10.5		
	5=1		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.2	10.2		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	54.4	53.9		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	44.5	44.5		
			OCDF (^{13}C-OCDD)	0.78	121	120		
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: ~~22536A1~~
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 1

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: W431355-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	10.0	NA	9.93	NA	99.3	99.3				
1,2,3,7,8-PeCDD	52.0		53.8		102	102				
1,2,3,4,7,8-HxCDD	56.5		53.7		95.1	95.0				
1,2,3,4,7,8,9-HpCDF	50.0		46.5		93.1	93.0				
OCDF	104		115		110	111				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Descriptor	Accurate mass[a]	Ion ID	Elemental Composition	Analyte	Descriptor	Accurate Mass[a]	Ion ID	Elemental Composition	Analyte
1	303.9016	M	$C_{12}H_4{}^{35}Cl_4O$	TCDF	4	407.7818	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	305.8987	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10$	TCDF		409.7788	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O$	HpCDF
	315.9419	M	$^{13}C_{12}H_4{}^{35}Cl_4O$	TCDF (S)		417.8250	M	$^{13}C_{12}H^{35}Cl_7O$	HpCDF (S)
	317.9389	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDF (S)		419.8220	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	319.8965	M	$C_{12}H_4{}^{35}Cl_4O_2$	TCDD		423.7767	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD
	321.8936	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10_2$	TCDD		425.7737	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD
	331.9368	M	$^{13}C_{12}H_4{}^{35}Cl_4O_2$	TCDD (S)		435.8169	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD (S)
	333.9338	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO_2$	TCDD (S)		437.8140	M+4	$^{13}C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD (S)
	375.8364	M+2	$C_{12}H_4{}^{35}Cl_5{}^{37}ClO$	HxCDPE		479.7165	M+4	$C_{12}H^{35}Cl_7{}^{37}Cl_2O$	NCDPE
	[354.9792]	LOCK	C_9F_{13}	PFK		[430.9728]	LOCK	C_9F_{17}	PFK
2	339.8597	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PeCDF	5	441.7428	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO$	OCDF
	341.8567	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF		443.7399	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O$	OCDF
	351.9000	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}C10$	PeCDF (S)		457.7377	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD
	353.8970	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF (S)		459.7348	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD
	355.8546	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD		469.7780	M+2	$^{13}C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD (S)
	357.8516	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD		471.7750	M+4	$^{13}C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD (S)
	367.8949	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD (S)		513.6775	M+4	$C_{12}{}^{35}Cl_8{}^{37}Cl_2O$	DCDPE
	369.8919	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD (S)		[422.9278]	LOCK	$C_{10}F_{17}$	PFK
	409.7974	M+2	$C_{12}H_3{}^{35}Cl_6{}^{37}ClO$	HpCDPE					
	[354.9792]	LOCK	C_9F_{13}	PFK					
3	373.8208	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF					
	375.8178	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDF					
	383.8639	M	$^{13}C_{12}H_2{}^{35}Cl_6O$	HxCDF (S)					
	385.8610	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF (S)					
	389.8156	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD					
	391.8127	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD					
	401.8559	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD (S)					
	403.8529	M+4	$^{13}C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD (S)					
	445.7555	M+4	$C_{12}H_2{}^{35}Cl_6{}^{37}Cl_2O$	OCDPE					
	[430.9728]	LOCK	C_9F_{17}	PFK					

(a) The following nuclidic masses were used:

H = 1.007825	O = 15.994915
C = 12.000000	^{35}Cl = 34.968853
^{13}C = 13.003355	^{37}Cl = 36.965903
F = 18.9984	

S = internal/recovery standard

LDC #: 22536A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: a

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, A:

$$\text{Conc.} = \frac{(3.9E3)(2000)(\quad)}{(1.65E6)(0.87)(10.5)(\quad)}$$

$= 0.523$ ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 15 through December 17, 2009
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Dioxins/Dibenzofurans
Validation Level:	EPA Level IV
Laboratory:	AXYS Analytical Services Ltd.
Sample Delivery Group (SDG):	DPWG31752/WG31593

Sample Identification

LDW-SS508-010
LDW-SS504-010
LDW-SS506-010
LDW-SS512-010
LDW-SS518-010
LDW-SS519-010
LDW-SS521-010
LDW-SS522-010
LDW-SS534-010
LDW-SS541-010
LDW-SS534-010DUP

Introduction

This data review covers 11 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1613B for Polychlorinated Dioxins/Dibenzofurans.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) Data (Revision 2.0, January 31, 1996) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between ^{13}C-2,3,7,8-TCDD and ^{13}C-1,2,3,4-TCDD was less than or equal to 25%.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all native compounds and less than or equal to 35.0% for all labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

The minimum S/N ratio was technically acceptable.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration concentrations were within the QC limits.

The ion abundance ratios for all PCDDs and PCDFs were within method criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
WG31593-101	1/25/10	1,2,3,4,6,7,8-HpCDD OCDD Total HpCDD	0.059 ng/Kg 0.080 ng/Kg 0.059 ng/Kg	All samples in SDG DPWG31752/WG31593

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

Method blank results flagged "K" by the laboratory as estimated maximum possible concentration (EMPC) were considered not detected.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
LDW-SS534-010DUP (LDW-SS534-010 LDW-SS534-010DUP)	1,2,3,4,7,8-HxCDF	55.4 (≤50)	J (all detects)	A

VII. Ongoing Precision & Recovery (OPR) and Standard Reference Material (SRM) Samples

Percent recoveries (%R) of the ongoing precision and recovery samples were within QC limits.

Standard reference material samples were analyzed at the required frequency.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG DPWG31752/WG31593	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
LDW-SS504-010 LDW-SS506-010 LDW-SS512-010 LDW-SS518-010 LDW-SS519-010 LDW-SS521-010 LDW-SS522-010 LDW-SS534-010 LDW-SS541-010 LDW-SS534-010DUP	2,3,7,8-TCDF (from DB-5)	R	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Data Qualification Summary - SDG DPWG31752/WG31593

SDG	Sample	Compound	Flag	A or P	Reason
DPWG31752/ WG31593	LDW-SS534-010 LDW-SS534-010DUP	1,2,3,4,7,8-HxCDF	J (all detects)	A	Duplicate sample analysis (RPD)
DPWG31752/ WG31593	LDW-SS508-010 LDW-SS504-010 LDW-SS506-010 LDW-SS512-010 LDW-SS518-010 LDW-SS519-010 LDW-SS521-010 LDW-SS522-010 LDW-SS534-010 LDW-SS541-010 LDW-SS534-010DUP	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A	Compound quantitation and CRQLs (EMPC)
DPWG31752/ WG31593	LDW-SS504-010 LDW-SS506-010 LDW-SS512-010 LDW-SS518-010 LDW-SS519-010 LDW-SS521-010 LDW-SS522-010 LDW-SS534-010 LDW-SS541-010 LDW-SS534-010DUP	2,3,7,8-TCDF (from DB-5)	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG DPWG31752/WG31593

No Sample Data Qualified in this SDG

LDC #: 22536B21 **VALIDATION COMPLETENESS WORKSHEET** Date: 2/10/10
SDG #: DPWG31752/WG31593 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services Ltd. Reviewer: a
2nd Reviewer: 1

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12/15-17/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	20/35%
IV.	Routine calibration	A	QC limits.
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates /Dup	N / SW	
VII.	Laboratory control samples	A	OPR. CRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	SW	
XII.	System performance	A	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:
All seds

1	LDW-SS508-010	11	LDW-SS534-010DUP	21	WF31593-101	31	
2	LDW-SS504-010	12		22		32	
3	LDW-SS506-010	13		23		33	
4	LDW-SS512-010	14		24		34	
5	LDW-SS518-010	15		25		35	
6	LDW-SS519-010	16		26		36	
7	LDW-SS521-010	17		27		37	
8	LDW-SS522-010	18		28		38	
9	LDW-SS534-010	19		29		39	
10	LDW-SS541-010	20		30		40	

Notes:

DC #: 22536B2/
DG #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: Q
2nd Reviewer: N

Method: Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% ~~for~~ 35% for unlabeled standards and ≤ 30% for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were ~~all percent differences (%D)~~ conc ~~≤ 20%~~ % for unlabeled standards ~~and ≤ 30% for~~ and labeled standards? meet QC limits ?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

)C #: 2253684
)G #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: 4
2nd Reviewer: n

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 40-135% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks $\geq$ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard $\geq$ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within $\pm$ 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N $\geq$ 2.5, at $\pm$ seconds RT) detected in the corresponding PCDPE channel?			✓	
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		

)C #: 22536B2
)G #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 3 of 3
Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans ~~(EPA SW 846 Method 8290)~~

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 22536B1
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method ~~8290~~ 1613)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 1/25/10 **Blank analysis date:** 1/29/10
Conc. units: ng/kg Associated Samples: all (>5x)

Compound	Blank ID	Sample Identification								
	WF31593-101									
F	0.059									
G	0.080									
U	0.059									

Blank extraction date:_____ **Blank analysis date:**_____
Conc. units:_____ Associated Samples:_____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

DC #: 22536B21
DG #: See cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

ETHOD: ___ GC ___ HPLC (EPA Method 1613)

ease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

N N/A Was a duplicate sample analyzed for each matrix in this SDG?

N N/A Were all duplicate sample relative percent differences (RPD) ≤ 50? (conc > 10x RDC)

EVEL IV ONLY:

N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	Duplicate ID	Matrix	Compound	RPD (Limits)	Associated Samples	Qualifications
		11	Sed	K	55.4	9, 11	Jdets/A
				~~P~~	~~43.9~~		~~R~~

omments:

V:\Validation Worksheets\GC\DUP.GC

LDC #: 22536B21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		all	ZMPC results	all	U

Comments: See sample calculation verification worksheet for recalculations

COMQUA90 21

LDC #: [illegible]
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2-11	H on DB-5	2-11	R/A

Comments:

SDG #: see cover

Initial Calibration Calculation Verification

Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1CA2	11/19/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.85	0.83	0.83	0.83	2.19	2.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	0.87	0.84	0.84	4.39	4.26
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	0.79	0.78	0.78	1.51	1.45
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	1.07	1.13	1.13	3.27	3.52
			OCDF (^{13}C-OCDD)	0.78	0.78	0.75	0.75	19.8	20.0
2	1CA6	12/23/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	0.92	0.91	0.91	4.69	4.56
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LOT #: [illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DXOM-012 S=1	1/28/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.3	10.4		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.3	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	54.3	54.1		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	44.6	44.8		
			OCDF (^{13}C-OCDD)	0.78	118	118		
2	DBOB031A S=2		2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	11.7	11.7		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DXOM-02 S=12	1/29/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.6	10.6		
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.2	10.1		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	54.2	53.7		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	44.5	44.6		
			OCDF (^{13}C-OCDD)	0.78	117	117		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22536B2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for th compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DXOM-013	2/1/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.1	10.2		
	S=1		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.0	10.0		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	54.6	54.2		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	43.3	43.3		
			OCDF (^{13}C-OCDD)	0.78	117	117		
2			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: [illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: K

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~) 1613)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WF31593-10 (DPR)

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	10.6	NA	9.72	NA	91.7	91.7				
1,2,3,7,8-PeCDD	56.6		49.6		87.6	87.6				
1,2,3,4,7,8-HxCDD	59.2		52.4		88.5	88.5				
1,2,3,4,7,8,9-HpCDF	50.0		44.2		88.4	88.4				
OCDF	109		118		109	108				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Descriptor	Accurate mass[a]	Ion ID	Elemental Composition	Analyte	Descriptor	Accurate Mass[a]	Ion ID	Elemental Composition	Analyte
1	303.9016	M	$C_{12}H_4{}^{35}Cl_4O$	TCDF	4	407.7818	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	305.8987	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10$	TCDF		409.7788	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O$	HpCDF
	315.9419	M	$^{13}C_{12}H_4{}^{35}Cl_4O$	TCDF (S)		417.8250	M	$^{13}C_{12}H^{35}Cl_7O$	HpCDF (S)
	317.9389	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDF (S)		419.8220	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	319.8965	M	$C_{12}H_4{}^{35}Cl_4O_2$	TCDD		423.7767	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD
	321.8936	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10_2$	TCDD		425.7737	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD
	331.9368	M	$^{13}C_{12}H_4{}^{35}Cl_4O_2$	TCDD (S)		435.8169	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD (S)
	333.9338	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO_2$	TCDD (S)		437.8140	M+4	$^{13}C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD (S)
	375.8364	M+2	$C_{12}H_4{}^{35}Cl_5{}^{37}ClO$	HxCDPE		479.7165	M+4	$C_{12}H^{35}Cl_7{}^{37}Cl_2O$	NCDPE
	[354.9792]	LOCK	C_9F_{13}	PFK		[430.9728]	LOCK	C_9F_{17}	PFK
2	339.8597	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PeCDF	5	441.7428	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO$	OCDF
	341.8567	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF		443.7399	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O$	OCDF
	351.9000	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}C10$	PeCDF (S)		457.7377	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD
	353.8970	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF (S)		459.7348	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD
	355.8546	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD		469.7780	M+2	$^{13}C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD (S)
	357.8516	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD		471.7750	M+4	$^{13}C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD (S)
	367.8949	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD (S)		513.6775	M+4	$C_{12}{}^{35}Cl_8{}^{37}Cl_2O$	DCDPE
	369.8919	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD (S)		[422.9278]	LOCK	$C_{10}F_{17}$	PFK
	409.7974	M+2	$C_{12}H_3{}^{35}Cl_6{}^{37}ClO$	HpCDPE					
	[354.9792]	LOCK	C_9F_{13}	PFK					
3	373.8208	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF					
	375.8178	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDF					
	383.8639	M	$^{13}C_{12}H_2{}^{35}Cl_6O$	HxCDF (S)					
	385.8610	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF (S)					
	389.8156	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD					
	391.8127	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD					
	401.8559	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD (S)					
	403.8529	M+4	$^{13}C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD (S)					
	445.7555	M+4	$C_{12}H_2{}^{35}Cl_6{}^{37}Cl_2O$	OCDPE					
	[430.9728]	LOCK	C_9F_{17}	PFK					

(a) The following nuclidic masses were used:

H = 1.007825	O = 15.994915
C = 12.000000	^{35}Cl = 34.968853
^{13}C = 13.003355	^{37}Cl = 36.965903
F = 18.9984	

S = internal/recovery standard

LDC #: 22536B1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1 . F :

Conc. = $\frac{(3.74e3)(2000)(\quad)}{(4.46e5)(1.07)(10.6)(\quad)}$

= 1.48 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

RECALC90.21

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

April 30, 2010

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed are the revised validation reports for the fractions listed below. These SDGs were received on February 10, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 22575:

SDG #	Fraction
QF92, QG62	Semivolatiles, Polynuclear Aromatic Hydrocarbons, Polychlorinated Biphenyls, Metals, Wet Chemistry

The data validation was performed under EPA Level III & IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005
- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005, Dioxin/Furan Addendum, December 2009
- USEPA, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Data Validation Operations Manager/Senior Chemist

V:\LOGIN\Windward\Duwamish\22575COV-R.wpd

Attachment 1

EDD	LDC #22575 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)																																				
LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270D)		SVOA (8270D-SIM)		PAH (8270D-SIM)		PCBs (8082)		Metals (SW846)		As (200.8)		TOC (Plumb)		Total Solids (160.3)		Part. Size (PSEP)																	
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	QF92	02/10/10	03/04/10	-	-	-	-	-	-	-	-	-	-	-	-	0	8	0	8	0	8																
B	QG62	02/10/10	03/04/10	0	2	0	2	0	12	0	12	0	2	0	10	-	-	-	-	-	-																
B	QG62	02/10/10	03/04/10	0	1	0	1	0	3	0	3	0	1	0	2	-	-	-	-	-	-																
Total	A/SC			0	3	0	3	0	15	0	15	0	3	0	10	0	8	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

22575ST.wpd

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22575

Semivolatiles

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 17, 2009 through January 11, 2010
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Semivolatiles
Validation Level:	EPA Level III & IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QG62

Sample Identification

LDW-SS502-010-comp
LDW-SS527-010**
LDW-SS603-010

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 3 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270D for Semivolatiles.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent EPA Level IV review. EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by EPA Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
1/28/10	Hexachlorocyclopentadiene	26.0	All samples in SDG QG62	J (all detects) UJ (all non-detects)	A
	2,4-Dinitrophenol	31.2		J (all detects) UJ (all non-detects)	

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS/LCSD-012610 (All samples in SDG QG62)	4-Chloroaniline 3,3'-Dichlorobenzidine Aniline	32.7 (40-130) 38.4 (40-130) 25.2 (40-130)	- - -	54.7 (≤50) - 57.6 (≤50)	J (all detects) UJ (all non-detects)	P

Standard reference material was analyzed at the required frequency.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
All samples in SDG QG62	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area and reported the average concentration for both compounds.	J (all detects) J (all detects)	A

The actual values of these compounds may be lower or higher than the values reported by the laboratory.

Raw data were not evaluated for the samples reviewed by EPA Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples LDW-SS527-010** and LDW-SS603-010 were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD
	LDW-SS527-010**	LDW-SS603-010	
Phenol	21	20	5
Benzoic acid	48	62	25
Acenaphthene	11	11	0
Fluorene	11	11	0
Phenanthrene	67	94	34

Compound	Concentration (ug/Kg)		RPD
	LDW-SS527-010**	LDW-SS603-010	
Anthracene	30	31	3
Di-n-butylphthalate	20	37	60
Fluoranthene	190	230	19
Pyrene	170	170	0
Benzo(a)anthracene	94	90	4
Bis(2-ethylhexyl)phthalate	320	230	33
Chrysene	150	140	7
Benzo(b)fluoranthene	87	94	8
Benzo(k)fluoranthene	87	94	8
Benzo(a)pyrene	86	94	9
Indeno(1,2,3-cd)pyrene	50	45	11
Dibenz(a,h)anthracene	26	22	17
Benzo(g,h,i)perylene	54	46	16
Dimethylphthalate	20U	180	200
Dibenzofuran	20U	11	200
Carbazole	20U	11	200

XVII. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Semivolatiles - Data Qualification Summary - SDG QG62

SDG	Sample	Compound	Flag	A or P	Reason
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010	Hexachlorocyclopentadiene 2,4-Dinitrophenol	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010	4-Chloroaniline Aniline	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD)
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010	3,3'-Dichlorobenzidine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs (peak resolution)

Lower Duwamish Waterway Group
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG QG62

No Sample Data Qualified in this SDG

LDC #: 22575B2a **VALIDATION COMPLETENESS WORKSHEET** Date: 2/25/10
SDG #: QG62 Level ~~IV~~ III/IV Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/11/10, 12/17/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	RSD. ≤2
IV.	Continuing calibration/ICV	SW	ICV/CCV ≤ 25%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client specified
VIII.	Laboratory control samples	SW	LCS/D, SPM
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 2+3
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** level IV

1	LDW-SS502-010-comp ** sed	11	MB-012610	21		31	
2	LDW-SS527-010 **	12		22		32	
3	LDW-SS603-010	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 22575B2a
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: N

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation?	✓			
Did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) > 0.05?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicate				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Was a MS/MSD analyzed every 20 samples of each matrix?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 225T5B29
SDG #: [illegible]

VALIDATION FINDINGS CHECKLIST

Page: 2 of [illegible]
Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
IX. Additional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Internal Standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target Compound Identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System Performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU.
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

LDC #: 22573B2a
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	1/28/10	01281001	X	26.0		All + Blk	[illegible]
			HH	31.2			

CONCAL.2S

LDC #: 22573B2a
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: Q
2nd Reviewer: R

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a LCS required?

Y (N) N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS/-012610	T	32.T (40-130)	( )	54.T (≤50)	All + Blk	J/UJ/P
		/LCSD	BBB	38.4 (↓)	( )	( )		↓
			NNN	25.2 (↓)	( )	57.6 (↓)		↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 205B3-9
SDG #: Second

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	~~FFF~~ and HHH were	all	Idets / A
			quan using same		
			peak, and reported		
			results were 1/2		
			of total conc for		
			each cpds		
			(peak could separated)		

Comments: See sample calculation verification worksheet for recalculations

COMQUA.2S

LDC#:22575B2a
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: Q
2nd Reviewer: M

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	Qualifications (Parent Only)
	2	3		
A	21	20	5	
PPP	48	62	25	
GG	11	11	0	
NN	11	11	0	
UU	67	94	34	
VV	30	31	3	
XX	20	37	60	
YY	190	230	19	
ZZ	170	170	0	
CCC	94	90	4	
EEE	320	230	33	
DDD	150	140	7	
GGG	87	94	8	
HHH	87	94	8	
III	86	94	9	
JJJ	50	45	11	
KKK	26	22	17	
LLL	54	46	16	
CC	20U	180	200	
JJ	20U	11	200	
WW	20U	11	200	

LDC #: 22515B24
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (25 std)	Recalculated RRF (25 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/11/10	Phenol (1st internal standard)	1.67486	1.67486	1.55526	1.55526	8.36977	8.36998
			Naphthalene (2nd internal standard)	1.00450	1.00450	0.97574	0.97574	14.97889	14.97911
			Fluorene (3rd internal standard)	1.31403	1.31403	1.20070	1.20070	18.11576	18.11558
			~~Pentachlorophenol~~ (4th internal standard) UU	1.03205	1.03205	1.04156	1.04156	16.99357	16.99357
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard) DDD	1.10626	1.10626	1.09288	1.09288	14.30332	14.30324
			Benzo(a)pyrene (6th internal standard)	0.99604	0.99604	0.99476	0.99476	14.16769	14.16776
2			~~Phenol~~ (1st internal standard) EEE	0.57667	0.57667	0.56601	0.56601	10.91271	10.91256
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B2a
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	0128I001	1/28/10	Phenol (1st internal standard)	1.55526	1.45406	1.45406	6.5	6.5
			Naphthalene (2nd internal standard)	0.97574	0.98156	0.98156	0.6	0.6
			Fluorene (3rd internal standard)	1.20070	1.26120	1.26120	5.1	5.0
			~~Pentachlorophenol~~ (4th internal standard) UU	1.04156	1.00348	1.00348	3.7	3.7
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard) DDD	1.09288	1.08766	1.08766	0.4	0.5
			Benzo(a)pyrene (6th internal standard)	0.99476	1.01416	1.01416	1.9	1.9
2			~~Phenol~~ (1st internal standard) ZZZ	0.56601	0.60740	0.60740	7.2	7.3
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22595B2a
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: K

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 2

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	25.0	15.2379	60.8	~~62~~ 61.0	0.2
2-Fluorobiphenyl	↓	18.1424	72.4	72.6	↓
Terphenyl-d14	↓	19.4222	77.6	77.7	0.1
Phenol-d5	37.5	30.2986	80.8	80.8	0
2-Fluorophenol	↓	23.8397	63.5	63.6	0.1
2,4,6-Tribromophenol	↓	33.8326	90.1	90.2	0.1
2-Chlorophenol-d4	↓	24.8059	66.1	66.1	0
1,2-Dichlorobenzene-d4	25.0	15.3466	61.2	61.4	0.2

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 22[illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)

LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: LCS/D-012610

Compound	Spike Added (Mg/kg)		Spike Concentration (Mg/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol	500	500	275	289	55.0	55.0	57.8	57.8	5.0	5.0
N-Nitroso-di-n-propylamine	↓	↓	278	298	55.6	55.6	59.6	59.6	6.9	6.9
4-Chloro-3-methylphenol	↓	↓	349	344	69.8	69.8	68.8	68.8	1.4	1.4
Acenaphthene	↓	↓	317	332	63.4	63.4	66.4	66.4	4.6	4.6
Pentachlorophenol	↓	↓	283	240	56.6	56.6	48.0	48.0	16.4	16.4
Pyrene	↓	↓	373	389	74.6	74.6	77.8	77.8	4.2	4.2

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B29
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 2 . A :

$$\text{Conc.} = \frac{(30343)(20.0)(500)(1)(\quad)}{(36930)(1.5552)(1)(25.1)(\quad)}$$

$= 21.0$ µg/Kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

RECALC.2S

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 17, 2009 through January 11, 2010
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Semivolatiles
Validation Level:	EPA Level III & IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QG62

Sample Identification

LDW-SS502-010-comp
LDW-SS527-010**
LDW-SS603-010
LDW-SS502-010-compMS
LDW-SS502-010-compMSD

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 5 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per a modification of EPA SW 846 Method 8270D using Selected Ion Monitoring (SIM) for Semivolatiles.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for compounds.

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
1/29/10	Hexachlorobenzene	36.3	All samples in SDG QG62	J (all detects) UJ (all non-detects)	A

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

Date	Compound	%D	Associated Samples	Flag	A or P
1/5/10	N-Nitrosodiphenylamine	31.94	All samples in SDG QG62	J (all detects) UJ (all non-detects)	A

All of the continuing calibration relative response factors (RRF) for were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB-012610	1/26/10	Diethylphthalate	19 ug/Kg	All samples in SDG QG62

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
LDW-SS502-010-compMS/MSD (LDW-SS502-010-comp)	Hexachlorobenzene	133 (40-130)	131 (40-130)	-	J (all detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
LCS-012610	Benzyl alcohol	0 (40-130)	All samples in SDG QG62	J (all detects) UJ (all non-detects)	P

Although the percent recovery for benzyl alcohol was severely low, using professional judgement, the associated results were qualified as estimated (J/UJ) since the MS/MSD percent recoveries were within the QC limits.

Standard reference material was analyzed at the required frequency.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples LDW-SS527-010** and LDW-SS603-010 were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD
	LDW-SS527-010**	LDW-SS603-010	
Butylbenzylphthalate	22	22	0

Lower Duwamish Waterway Group
Semivolatiles - Data Qualification Summary - SDG QG62

SDG	Sample	Compound	Flag	A or P	Reason
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010	Hexachlorobenzene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010	N-Nitrosodiphenylamine	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)
QG62	LDW-SS502-010-comp	Hexachlorobenzene	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010	Benzyl alcohol	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

Lower Duwamish Waterway Group
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG QG62

No Sample Data Qualified in this SDG

CLDC #: 22575B2b

SDG #: QG62

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ III/IV

Date: 2/25/10

Page: 1 of 1

Reviewer: Q

2nd Reviewer: N

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D-SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12/17/09 - 1/11/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	RSD. r^2
IV.	Continuing calibration/ICV	SW	ICV/CCV ≤ >25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS. SRM
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D=2+3
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** level IV

MI Seds

1	LDW-SS502-010-comp	11	MB-012610	21		31	
2	LDW-SS527-010 **	12		22		32	
3	LDW-SS603-010	13		23		33	
4	LDW-SS502-010-compMS	14		24		34	
5	LDW-SS502-010-compMSD	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 22575B26
SDG #: 2e1 conn

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: [illegible]

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation?	✓			
Did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) ≥ 0.05?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 02575B26
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
[illegible]				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
[illegible]				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
[illegible]				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. [illegible]				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU.
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

LDC #: 22573B-6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: 1
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	1/5/10	IC010507 (ICV)	22	31.94		All + Blk	J/UJ/A
	1/29/10	CC0129	55	36.3		All + Blk	J/UJ/A

CONCAL2S

LDC #: 20575B26
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: GC/MS BNA (EPA SW 846 Method 8270)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 1/26/10 **Blank analysis date:** 1/29/10
Conc. units: µg/kg Associated Samples: all

Compound	Blank ID	Sample Identification								
MB	012610									
LL	19									

Blank extraction date:_____ **Blank analysis date:**_____
Conc. units:_____ Associated Samples:_____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: [illegible]
SDG #: [illegible]

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		4/5	SS	133 (40-130)	131 (40-130)	( )	1	J data/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 22575B2b
SDG #: See cover

Reviewer: [illegible]
2nd Reviewer: [illegible]

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a LCS required?
Y (N) N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS-012610	QQQ	0 (40-130)	( )	( )	All + Bk	J/UJ/P *
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		* ~~due to~~ MS/MSD in
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

SDG #: See cover

Field Duplicates

Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (µg/kg)		RPD
	2	3	
AAA	22	22	0

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

LDC #: 225SDV
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (2.5 std)	Recalculated RRF (2.5 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/5/10	~~Phenol~~ (1st internal standard) J	1.39959	1.39959	1.41012	1.41012	2.55958	2.5596
			~~Naphthalene~~ (2nd internal standard) R	0.27095	0.27095	0.28212	0.28212	4.42310	4.4235
			~~Fluorene~~ (3rd internal standard) LL	1.50317	1.50317	1.50245	1.50245	3.00941	3.0095
			~~Pentachlorophenol~~ (4th internal standard) SS	0.18204	0.18204	0.18973	0.18973	4.71510	4.7150
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard) AAA	0.81195	0.81195	0.78222	0.78222	4.50549	4.5056
			Benzo(a)pyrene (6th internal standard)						
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B2b
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: a
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	ec0129	1/29/10	~~Phenol~~ (1st internal standard) J	1.41012	1.32392	1.32392	6.1	6.1
			~~Naphthalene~~ (2nd internal standard) R	0.28212	0.32291	0.32291	14.5	14.5
			~~Fluorene~~ (3rd internal standard) LL	1.50245	1.75273	1.75273	16.7	16.7
			Pentachlorophenol (4th internal standard) SS	0.18973	0.25930	0.25930	36.3	36.7
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard) AAA	0.78222	0.94423	0.94423	20.7	20.7
			Benzo(a)pyrene (6th internal standard)					
2			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 225/5326
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 2

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.50	1.46654	58.8	58.7	0.1
2-Fluorobiphenyl	↓	1.86182	74.4	74.5	↓
Terphenyl-d14	↓	1.82824	73.2	73.1	↓
Phenol-d5	3.75	2.18075	58.1	58.2	↓
2-Fluorophenol	↓	1.81533	48.5	48.4	↓
2,4,6-Tribromophenol	↓	3.00306	80.0	80.1	↓
2-Chlorophenol-d4	↓	1.95118	52.0	52.0	0
1,2-Dichlorobenzene-d4	2.50	1.47885	59.2	59.2	↓

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 22575B36
SDG #: Secondary

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 9
2nd Reviewer: 1

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration, SA = Spike added, SC = Sample concentation

RPD = I MSC - MSC I * 2/(MSC + MSDC) MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration

MS/MSD samples: 4/5

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	Spiked Sample Concentration (ug/L)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-----	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine	151	152	ND	115	115	76.2	76.2	75.7	75.7	0.0	0.0
4-Chloro-3-methylphenol											
Acenaphthene											
Pentachlorophenol	151	152	ND	133	131	88.1	88.1	86.2	86.2	1.5	1.5
Pyrene											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B26
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)

LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: LCS-012610

Compound	Spike Added (µg/L)		Spike Concentration (µg/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine	156	NA	116	NA	74.4	74.4				
4-Chloro-3-methylphenol										
Acenaphthene										
Pentachlorophenol	156	NA	108	NA	69.2	69.2				
Pyrene										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B-6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: 12

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 2, AAA:

Conc. = $\frac{(29502)(2.0)(1000)(1)(\quad)}{(209888)(0.78222)(1)(16.2)(\quad)}$

= 22.18 µg/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

RECALC.2S

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22575

Polynuclear Aromatic Hydrocarbons

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwmaish Waterway Group
Collection Date:	December 15, 2009 through January 12, 2010
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Polynuclear Aromatic Hydrocarbons
Validation Level:	EPA Level III & IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QG62

Sample Identification

LDW-SS503-043-comp
LDW-SS503-043-compDL
LDW-SS508-010**
LDW-SS509-010**
LDW-SS509-010DL**
LDW-SS523-010**
LDW-SS525-010
LDW-SS526-010
LDW-SS526-010DL
LDW-SS529-041-comp
LDW-SS529-041-compDL
LDW-SS530-010
LDW-SS530-010DL
LDW-SS531-010-comp
LDW-SS533-043-comp
LDW-SS544-010-comp
LDW-SS547-010
LDW-SS601-010
LDW-SS601-010MS
LDW-SS601-010MSD

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 20 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per a modification of EPA SW 846 Method 8270D using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. The cooler temperature for samples LDW-SS525-010, LDW-SS526-010 and LDW-SS526-010DL was reported at 10.6°C upon receipt by the laboratory. Using professional judgment, associated results were not qualified as estimated since polynuclear aromatic hydrocarbons are not expected to degrade significantly during transport.

All other cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

The percent differences (%D) of the second source calibration standard were less than or equal to 25.0% for all compounds.

All of the continuing calibration relative response factors (RRF) for were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for LDW-SS529-041-compDL and LDW-SS530-010DL . Since the samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
LDW-SS601-010MS/MSD (LDW-SS601-010)	Fluoranthene	154 (40-130)	-	-	J (all detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

Standard reference material was analyzed at the required frequency.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
LDW-SS503-043-comp	Fluoranthene Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	NA	-
LDW-SS509-010**	Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	NA	-
LDW-SS526-010	Fluoranthene Pyrene Chrysene	Sample result exceeded calibration range.	Reported result should be within calibration range.	NA	-
LDW-SS529-041-comp	Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	Sample result exceeded calibration range.	Reported result should be within calibration range.	NA	-
LDW-SS530-010	Naphthalene 2-Methylnaphthalene 1-Methylnaphthalene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	Sample result exceeded calibration range.	Reported result should be within calibration range.	NA	-

N/A = Not applicable

For the results above flagged "Not applicable", the affected compound results in the associated samples were deemed unusable and did not warrant qualification of the data.

Sample	Compound	Finding	Flag	A or P
LDW-SS503-043-comp LDW-SS508-010** LDW-SS509-010** LDW-SS509-010DL** LDW-SS523-010** LDW-SS525-010 LDW-SS526-010 LDW-SS526-010DL LDW-SS529-041-comp LDW-SS529-041-compDL LDW-SS530-010 LDW-SS530-010DL LDW-SS531-010-comp LDW-SS533-043-comp LDW-SS544-010-comp LDW-SS547-010 LDW-SS601-010	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area and reported the average concentration for both compounds.	J (all detects) J (all detects)	A

The actual values of these compounds may be lower or higher than the values reported by the laboratory.

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
LDW-SS503-043-comp	Fluoranthene Pyrene	R R	A
LDW-SS503-043-compDL	All TCL compounds except Fluoranthene Pyrene	R	A

Sample	Compound	Flag	A or P
LDW-SS509-010**	Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene	R R R R R R R R	A
LDW-SS509-010DL**	All TCL compounds except Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene	R	A
LDW-SS526-010	Fluoranthene Pyrene Chrysene	R R R	A
LDW-SS526-010DL	All TCL compounds except Fluoranthene Pyrene Chrysene	R	A
LDW-SS529-041-comp	Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R R R R R R R R R R R R	A
LDW-SS529-041-compDL	All TCL compounds except Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R	A

Sample	Compound	Flag	A or P
LDW-SS530-010	Naphthalene 2-Methylnaphthalene 1-Methylnaphthalene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R R R R R R R R R R R R R R R R R	A
LDW-SS530-010DL	All TCL compounds except Naphthalene 2-Methylnaphthalene 1-Methylnaphthalene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R	A

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

Samples LDW-SS523-010** and LDW-SS601-010 were identified as field duplicates. No polynuclear aromatic hydrocarbons were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD
	LDW-SS523-010**	LDW-SS601-010	
Naphthalene	5.7	4.8U	200
Acenaphthylene	9.5	10	5
Acenaphthene	4.8	6.3	27
Fluorene	6.2	6.3	2
Phenanthrene	42	81	63

Compound	Concentration (ug/Kg)		RPD
	LDW-SS523-010**	LDW-SS601-010	
Anthracene	22	32	37
Fluoranthene	150	230	42
Pyrene	90	150	50
Benzo(a)anthracene	65	94	36
Chrysene	150	180	18
Benzo(b)fluoranthene	85	110	26
Benzo(k)fluoranthene	85	110	26
Benzo(a)pyrene	72	110	42
Indeno(1,2,3-cd)pyrene	49	68	32
Dibenz(a,h)anthracene	17	26	42
Benzo(g,h,i)perylene	66	81	20

XVII. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG QG62

SDG	Sample	Compound	Flag	A or P	Reason
QG62	LDW-SS601-010	Fluoranthene	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
QG62	LDW-SS503-043-comp LDW-SS508-010** LDW-SS509-010** LDW-SS509-010DL** LDW-SS523-010** LDW-SS525-010 LDW-SS526-010 LDW-SS526-010DL LDW-SS529-041-comp LDW-SS529-041-compDL LDW-SS530-010 LDW-SS530-010DL LDW-SS531-010-comp LDW-SS533-043-comp LDW-SS544-010-comp LDW-SS547-010 LDW-SS601-010	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs (peak resolution)
QG62	LDW-SS503-043-comp	Fluoranthene Pyrene	R R	A	Overall assessment of data
QG62	LDW-SS503-043-compDL	All TCL compounds except Fluoranthene Pyrene	R	A	Overall assessment of data
QG62	LDW-SS509-010**	Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene	R R R R R R R R	A	Overall assessment of data
QG62	LDW-SS509-010DL**	All TCL compounds except Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene	R	A	Overall assessment of data
QG62	LDW-SS526-010	Fluoranthene Pyrene Chrysene	R R R	A	Overall assessment of data
QG62	LDW-SS526-010DL	All TCL compounds except Fluoranthene Pyrene Chrysene	R	A	Overall assessment of data

SDG	Sample	Compound	Flag	A or P	Reason
QG62	LDW-SS529-041-comp	Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R R R R R R R R R R R R	A	Overall assessment of data
QG62	LDW-SS529-041-compDL	All TCL compounds except Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R	A	Overall assessment of data
QG62	LDW-SS530-010	Naphthalene 2-Methylnaphthalene 1-Methylnaphthalene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R R R R R R R R R R R R R R R R R	A	Overall assessment of data
QG62	LDW-SS530-010DL	All TCL compounds except Naphthalene 2-Methylnaphthalene 1-Methylnaphthalene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG QG62

No Sample Data Qualified in this SDG

CLDC #: 22575B2c

SDG #: QG62

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ III/IV

Date: 2/05/10

Page: 1 of 1

Reviewer: a

2nd Reviewer: n

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270D-SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 12/15/09 – 1/12/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ICV/CCV ≤ 25%
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	~~SW~~ A	LCS. SRM
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D = 6+18
XVII.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** level IV

MI Seds

1	LDW-SS503-043-comp	11	LDW-SS529-041-compDL	21	MB-012610	31	
2	LDW-SS503-043-compDL	12	LDW-SS530-010	22		32	
3	LDW-SS50~~3~~8-010 **	13	LDW-SS530-010DL	23		33	
4	LDW-SS509-010 **	14	LDW-SS531-010-comp	24		34	
5	LDW-SS509-010DL **	15	LDW-SS533-~~010~~043-comp	25		35	
6	LDW-SS523-010 **	16	LDW-SS544-010-comp	26		36	
7	LDW-SS525-010	17	LDW-SS547-010	27		37	
8	LDW-SS526-010	18	LDW-SS601-010-~~010~~-	28		38	
9	LDW-SS526-010DL	19	LDW-SS601-010-~~010~~MS	29		39	
10	LDW-SS529-041-comp	20	LDW-SS601-010-~~010~~MSD	30		40	

LDC #: 22575B2C
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: Q
2nd Reviewer: M

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.		✓		
II. GC/MS tuning and performance				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Was a curve fit used for evaluation?		✓		
Did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			✓	
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) > 0.05?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?		✓		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/matrix spike duplicate				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1-Methylnaphthalene
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU.
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

LDC #: 22575B2C
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XVII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 225TB2a
SDG #: Second

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD : GC/MS BNA (EPA SW 846 Method 8270)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
T-9		Temp	@ 10.6				Text

ECHNICAL HOLDING TIME CRITERIA

/ater: Extracted within 7 days, analyzed within 40 days.
oil: Extracted within 14 days, analyzed within 40 days.

LDC #: [illegible]
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)
Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were percent recoveries (%R) for surrogates within QC limits?
Y N N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y N N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		13 (50x)	All	DO (–)	No Cal
			↓	( )	↓
		11 (50x)	↓	↓ (–)	↓
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)		QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114	S5 (2FP)= 2-Fluorophenol	25-121	21-100
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116	S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S3 (TPH) = Terphenyl-d14	18-137	33-141	S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S4 (PHL) = Phenol-d5	24-113	10-94	S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 22575B2c
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: Q
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		19/20	YY	154 (40-130)	( )	( )	18	Idets/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 22513B2C
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: a
2nd Reviewer: a

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding: cpds > calib range	Associated Samples	Qualifications
		1	YY.22 ~~> calib range~~	1	NA ~~dilute/A~~
		4	UU, YY. 22. CCC.	4	
			DDD. ~~EEE~~. HHH		
			III		
		8	YY. 22. DDD	8	
		10	UU. VV. YY. 22. CCC. DDD	10	
			~~EEE~~. HHH. III. NN		
			~~KK~~. LLL		
		12	S. W. TT. ~~EE~~. NN. UU. VV	12	
			YY. 22. CCC. DDD. ~~EEE~~		
			HHH. III. NN. ~~KK~~. LLL		

Comments: See sample calculation verification worksheet for recalculations

COMQUA.2S

LDC #: 22453B2C
SDG #: Second

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		~~1-18~~ 1.3-18	~~FFF~~ and HHH were	1.3-18	Jdets/A
			quan using same		
			peak. The		
			reported results		
			for each cpd was		
			1/2 of total ~~x~~ conc		
			(peak could separated)		

Comments: See sample calculation verification worksheet for recalculations

COMQUA.2S

LDC #: 22575B2c
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1	YY. ZZ	1	E/A
		2	All except YY, ZZ	2	
		4	UU. YY. ZZ. CCC.	4	
			DDD. ~~EEE~~. HHH. III		
		5	All except above	5	
			(opl #4)		
		8	YY. ZZ. DDD	8	
		9	All except above #8	9	

Comments:

OVR.2S

LDC #: 225/5B2c
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: a
2nd Reviewer: K

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		10	UU. VV. YY. ZZ. CCC. DDD	10	P/A
			~~EEE~~. HHH. III. JJJ. ~~KKK~~		
			LLL		
		11	All except above	11	
		12	S.W. TTT. ~~EEE~~. NN. UU	12	
			VV. YY. ZZ. CCC. DDD		
			~~EEE~~. HHH. III. JJJ		
			~~KKK~~. LLL		
		13	All except above #12	13	

Comments:

LDC#:22575B2c
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS PAHs (EPA SW 846 Method 8270D-SIM)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD	Qualifications (Parent Only)
	6	18		
S	5.7	4.8U	200	
DD	9.5	10	5	
GG	4.8	6.3	27	
NN	6.2	6.3	2	
UU	42	81	63	
VV	22	32	37	
YY	150	230	42	
ZZ	90	150	50	
CCC	65	94	36	
DDD	150	180	18	
GGG	85	110	26	
~~KKK~~ HHH	85	110	26	
III	72	110	42	
JJJ	49	68	32	
KKK	17	26	42	
LLL	66	81	20	

LDC #: 22452C
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (2.5 std)	Recalculated RRF (2.5 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/15/09	Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)	1.034	1.034	1.053	1.053	3.7	3.7
			Fluorene (3rd internal standard)	1.267	1.267	1.250	1.250	3.6	3.6
			~~Pentachlorophenol~~ (4th internal standard) UU	1.119	1.119	1.132	1.132	3.5	3.5
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard) DDD	1.135	1.135	1.116	1.116	3.1	3.1
			Benzo(a)pyrene (6th internal standard)	1.050	1.050	1.046	1.046	5.0	5.0
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B2c
SDG #: Gerlesner

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CC0128	1/28/10	Phenol (1st internal standard)	1.05				
			Naphthalene (2nd internal standard)	1.053	1.05674	1.05674	0.4	0.4
			Fluorene (3rd internal standard)	1.250	1.30266	1.30266	4.2	4.2
			~~Pentachlorophenol~~ (4th internal standard) UU	1.132	1.11704	1.11704	1.3	1.3
			~~Bis(2-ethylhexyl)phthalate~~ (5th internal standard) DDD	1.116	1.14113	1.14113	2.2	2.2
			Benzo(a)pyrene (6th internal standard)	1.046	1.04626	1.04626	0.0	0.0
2	CC0129A	1/29/10	Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)	1.053	1.06168	1.06168	0.8	0.8
			Fluorene (3rd internal standard)	1.250	1.26110	1.26110	0.9	0.9
			~~Pentachlorophenol~~ (4th internal standard) UU	1.132	1.12307	1.12307	0.8	0.8
			Bis(2-ethylhexyl)phthalate (5th internal standard) DDD	1.116	1.10653	1.10653	0.9	0.9
			Benzo(a)pyrene (6th internal standard)	1.046	1.02219	1.02219	2.3	2.3
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22573B2C
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: N

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 3

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
~~Nitrobenzene-d5~~ d10-W	3.0	1.96459	65.3	65.5	0.2
2-Fluorobiphenyl d14-kkk	↓	2.59885	86.7	86.6	0.1
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
~~1,2-Dichlorobenzene-d4~~					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 22573B2c
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 11

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = I MSC - MSC I * 2/(MSC + MSDC) MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration

MS/MSD samples: 19/20

Compound	Spike Added (ug/L)		Sample Concentration (ug/L)	Spiked Sample Concentration (ug/L)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	----	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	144	147	6.3	127	131	83.8	83.8	84.8	84.8	3.1	3.1
Pentachlorophenol											
Pyrene	144	147	150	275	252	86.8	86.8	69.4	69.4	8.7	8.7

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22T5B2C
SDG #: Second

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 12

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)

LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: LCS-01 P610

Compound	Spike Added (µg/kg)		Spike Concentration (µg/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	150	NA	103	NA	68.7	68.7				
Pentachlorophenol										
Pyrene	150	NA	118	NA	78.7	78.7				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22573B2C
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 4 , 5 :

Conc. = $\frac{(5349)(2.0)(500)(1)(\quad)}{(182316)(1.053)(3.26)(1)(\quad)}$

= 91.63 µg/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

RECALC.2S

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22575

Polychlorinated Biphenyls

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 15, 2009 through January 12, 2010
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Polychlorinated Biphenyls
Validation Level:	EPA Level III & IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QG62

Sample Identification

LDW-SS502-010-comp
LDW-SS527-010**
LDW-SS603-010
LDW-SS503-043-comp
LDW-SS508-010**
LDW-SS509-010**
LDW-SS523-010
LDW-SS525-010
LDW-SS526-010
LDW-SS529-041-comp
LDW-SS530-010
LDW-SS531-010-comp
LDW-SS533-043-comp
LDW-SS544-010-comp
LDW-SS547-010
LDW-SS523-010MS
LDW-SS523-010MSD
LDW-SS525-010MS
LDW-SS525-010MSD

**Indicates sample underwent EPA Level IV review.

Introduction

This data review covers 19 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. The cooler temperature for samples LDW-SS525-010 and LDW-SS526-010 was reported at 10.6°C upon receipt by the laboratory. Using professional judgment, associated results were not qualified as estimated since polychlorinated biphenyls are not expected to degrade significantly during transport.

All other cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of multicomponent compounds was performed for the primary (quantitation) column as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
1/15/10	0114B044	ZB35	Aroclor-1268	21.2	LDW-SS527-010** LDW-SS603-010 LDW-SS503-043-comp LDW-SS508-010** LDW-SS525-010 LDW-SS531-010-comp LDW-SS544-010-comp LDW-SS547-010 LDW-SS525-010MS LDW-SS525-010MSD MB-0126102	Aroclor-1268	J (all detects) UJ (all non-detects)	A
1/27/10	0127A021	ZB35	Aroclor-1268	24.0	LDW-SS502-010-comp LDW-SS509-010** LDW-SS523-010 LDW-SS526-010 LDW-SS529-041-comp LDW-SS530-010 LDW-SS533-043-comp LDW-SS523-010MS LDW-SS523-010MSD MB-012610	Aroclor-1268	J (all detects) UJ (all non-detects)	A

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyl contaminants were found in the method blanks.

VI. Surrogate Spikes and Internal Standards

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

All internal standard areas and retention times were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples LDW-SS527-010** and LDW-SS603-010 were identified as field duplicates. No polychlorinated biphenyls were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD
	LDW-SS527-010**	LDW-SS603-010	
Aroclor-1248	23	23	0
Aroclor-1254	37	35	6
Aroclor-1260	31	20	43

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Data Qualification Summary - SDG QG62

SDG	Sample	Compound	Flag	A or P	Reason
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010 LDW-SS503-043-comp LDW-SS508-010** LDW-SS509-010** LDW-SS523-010 LDW-SS525-010 LDW-SS526-010 LDW-SS529-041-comp LDW-SS530-010 LDW-SS531-010-comp LDW-SS533-043-comp LDW-SS544-010-comp LDW-SS547-010	Aroclor-1268	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)

Lower Duwamish Waterway Group
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG QG62

No Sample Data Qualified in this SDG

LDC #: 22575B3b

VALIDATION COMPLETENESS WORKSHEET

SDG #: QG62

Level ~~IV~~ III/IV

Laboratory: Analytical Resources, Inc.

Date: 2/26/10

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 12/15/09 - 1/12/10
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	ICV/CCV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	D = 2+3.
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** level IV

MSeds

1	LDW-SS502-010-comp	11	LDW-SS530-010	21	MB-012610	31	
2	LDW-SS527-010 **	12	LDW-SS531-010-comp	22	MB-012610 2	32	
3	LDW-SS603-010	13	LDW-SS533-~~010~~ 013-comp	23		33	
4	LDW-SS503-043-comp	14	LDW-SS544-010-comp	24		34	
5	LDW-SS~~503~~ 508-010 **	15	LDW-SS547-010	25		35	
6	LDW-SS509-010 **	16	LDW-SS523-010MS	26		36	
7	LDW-SS523-010	17	LDW-SS523-010MSD	27		37	
8	LDW-SS525-010	18	LDW-SS525-010MS	28		38	
9	LDW-SS526-010	19	LDW-SS525-010MSD	29		39	
10	LDW-SS529-041-comp	20		30		40	

DC #: 22575B36
DG #: 20 COND

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: N

Method: ✓ GC ____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation?		✓		
Did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?			✓	
Were the RT windows properly established?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ ~~15%.0 or percent recoveries 85-115%?~~ 20% ?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

.DC #: 225753b
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
X. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Aroclor-1268	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:

LDC #: 22573336
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer:
2nd Reviewer:

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD: ✓ GC ___ HPLC

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
8-9	Temp @ 10.6 °C						Text

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:
- Water unpreserved: Aromatic within 7 days, non-aromatic within 14 days of sample collection.
- Water preserved: Both within 14 days of sample collection.
- Soils: Both within 14 days of sample collection.

EXTRACTABLES:
- Water: Extracted within 7 days, analyzed within 40 days.
- Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 22573B36
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 11

METHOD: __ GC __ HPLC (EPA_____)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? __%D or __RPD
Y N N/A Were continuing calibration standards analyzed at the required frequencies?
Y N N/A Did the continuing calibration standards meet the %D / RPD validation criteria of ≤15.0%?
Level IV Only
Y N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Column / ~~Detector~~	Compound	%D / RPD (Limit ≤ 15.0)	RT (Limits)	Associated Samples	Qualifications
	1/15/10	014B044	2B35	ZE	21.2	( )	2-5, 8, 12	J/UJ/A
		(1CV)				( )	14-15, 18-19	
						( )	MB-012610Z	
						( )		
						( )		
	1/27/10	012TA021	2B35	ZE	24.0	( )	1.6-7.9-11	J/UJ/A
		(1CV)				( )	13.16-17	
						( )	MB-012610	
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
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						( )		
						( )		
						( )		
						( )		

A.____ B.____ C.____ D.____ E.____ F.____ G.____ H.____ I.____ J.____ K.____ L.____ M.____ O.____ P.____

LDC #: 22575B3b
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: 1 GC __ HPLC (EPA_____)

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (µg/g)		RPD
	2	3	
Z	23	23	0
AA	37	35	6
BB	31	20	43

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

LDC #: 22575B36
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 1

METHOD: GC ✓ HPLC ____

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (0.1 std)	Recalculated CF (0.1 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/14/10	BB-1 (2B5)	0.116T	0.116T	0.1136	0.1136	11.3	11.3
			BB-1 (2B35)	0.1188	0.1188	0.14T	0.14T	10.6	10.6
2	ICAL	1/27/10	BB-1 (2B5)	0.1238T	0.1238T	0.12108	0.12108	5.32T	5.326
			BB-1 (2B35)	0.08378	0.08378	0.0825	0.0825	18.452	18.451
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B3b
SDG #: Seicover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: a
2nd Reviewer: u

METHOD: GC ✓ HPLC _____

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	0128B064	1/29/10	BB-1 (2B5)	250.0	239.6	239.6	4.2	4.1
			BB-1 (2B35)	↓	242.0	242.0	3.2	3.2
2	0201B002	2/1/10	BB-1 (2B05)	250.0	266.4	266.5	6.6	6.6
			BB-1 (2B35)	↓	254.4	254.4	1.8	1.8
3	0129A006	1/29/10	BB-1 (2B5)	250.0	259.5	259.5	3.8	3.8
			BB-1 (2B35)	250.0	240.1	240.1	4.0	4.0
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 225T5B3b
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 6

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
DCB	2B5	8.0	9.7	121	121	0
TCMX	2B35	8.0	6.0	74.6	75	0.4

Sample ID: _____

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID: _____

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 25[illegible]b
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = I SSCLCS - SSCLCSD I * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration; SA = Spike added; LCS = Laboratory control sample percent recovery; SC = Concentration; LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS-DF610

Compound	Spike Added (mg/kg)		Spiked Sample Concentration (mg/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)										
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										
BB	20.0	NA	14.3	NA	71.5	71.5				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22553b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 9
2nd Reviewer: 2

METHOD: ✓ GC ___ HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

Where SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentration

RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100

MS = Matrix spike; MSD = Matrix spike duplicate

MS/MSD samples: 16/17

Compound	Spike Added (µg/kg)		Sample Conc. (µg/kg)	Spike Sample Concentration (µg/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
BB	97.1	98.0	325	106	110	75.7	75.7	79.1	79	3.7	3.7

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B3b
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound In the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. 2 Compound Name BB-2

Concentration = $\frac{(6066468)(80)}{(\cancel{254}\,24581733)(\cancel{0.09245}\ 0.1138)}$

= 173.49

PCB 1260 = $\frac{(173.49+141.2+149.3)(5)(1)}{(3)(25.2)}$ = 30.7 µg/kg

#	Sample ID	Compound	Reported Concentrations ( )	Recalculated Results Concentrations ( )	Qualifications

Comments: _____

SAMPCALew.wpd

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22575

Metals

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 15, 2009 through January 12, 2010
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Metals
Validation Level:	EPA Level III & IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Group (SDG):	QG62

Sample Identification

LDW-SS502-010-comp
LDW-SS527-010**
LDW-SS603-010
LDW-SS503-043-comp
LDW-SS508-010**
LDW-SS509-010**
LDW-SS523-010
LDW-SS525-010
LDW-SS526-010
LDW-SS529-041-comp
LDW-SS530-010
LDW-SS531-010-comp
LDW-SS533-043-comp
LDW-SS544-010-comp
LDW-SS547-010
LDW-SS502-010-compMS
LDW-SS502-010-compDUP

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 17 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 200.8 and EPA SW 846 Method 7000 for Metals. The metals analyzed were Antimony, Arsenic, Cadmium, Chromium, Cobalt, Copper, Lead, Molybdenum, Mercury, Nickel, Selenium, Silver, Thallium, Vanadium, and Zinc.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5% .

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

CRDL standards for ICP and AA were analyzed and reported as required.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Copper Zinc	0.3 mg/Kg 1 mg/Kg	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010 LDW-SS502-010-compDUP

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
LDW-SS502-010-compMS (LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010 LDW-SS502-010-compDUP)	Antimony	12.8 (70-130)	J (all detects) UJ (all non-detects)	A

Although the percent recovery for antimony was severely low, using professional judgement, the associated results were qualified as estimated (J/UJ) since the post spike percent recovery was within the QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
LDW-SS502-010-compDUP (LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010)	Nickel	30.8 (≤30)	-	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Internal Standards

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XII. Sample Result Verification

All sample result verifications were acceptable for samples on which an EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples LDW-SS527-010** and LDW-SS603-010 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)
	LDW-SS527-010**	LDW-SS603-010	
Arsenic	18.5	16.7	10 (≤50)
Chromium	20	25.8	25 (≤50)
Cobalt	6.7	8.6	25 (≤50)
Copper	31.4	39.7	23 (≤50)
Lead	10	15	40 (≤50)
Mercury	0.09	0.10	11 (≤50)
Nickel	16	21	27 (≤50)
Vanadium	46.9	60.7	26 (≤50)
Zinc	62	80	25 (≤50)

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Metals - Data Qualification Summary - SDG QG62

SDG	Sample	Analyte	Flag	A or P	Reason
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010 LDW-SS502-010-compDUP	Antimony	J (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R)
QG62	LDW-SS502-010-comp LDW-SS527-010** LDW-SS603-010 LDW-SS502-010-compDUP	Nickel	J (all detects) UJ (all non-detects)	A	Duplicate analysis (RPD)

Lower Duwamish Waterway Group
Metals - Laboratory Blank Data Qualification Summary - SDG QG62

No Sample Data Qualified in this SDG

LDC #: 22575B4

SDG #: QG62

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level ~~IV~~ III/IV

Date: 2-16-10

Page: 1 of 1

Reviewer: MG

2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 200.8, EPA SW 846 Method 7000)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A ~~SW~~	Sampling dates: 12-15-09 through 1-12-10
II.	ICP/MS Tune	A	
III.	Calibration	A	CRDL std (70-130 %)
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	SW	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	not utilized
XI.	ICP Serial Dilution	N	not performed
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	D = 2+3
XV	Field Blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: ** level IV all sediment

1	LDW-SS502-010-comp	11	LDW-SS530-010	21		31	
2	LDW-SS527-010 **	12	LDW-SS531-010-comp	22		32	
3	LDW-SS603-010	13	LDW-SS533-0~~10~~-043-comp	23	[illegible]	33	
4	LDW-SS503-043-comp	14	LDW-SS544-010-comp	24		34	
5	LDW-SS50~~1~~8-010 -SS508- **	15	LDW-SS547-010	25		35	
6	LDW-SS509-010 **	16	LDW-SS502-010-compMS	26		36	
7	LDW-SS523-010	17	LDW-SS502-010-comp~~MSD~~ DUP	27		37	
8	LDW-SS525-010	18	PBS	28		38	
9	LDW-SS526-010	19		29		39	
10	LDW-SS529-041-comp	20		30		40	

Notes:

LDC #: 22575B4
SDG #: QG62

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: [illegible]

Method: Metals (EPA SW 846 Method 6010/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓	✗		
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury and 85-115% for cyanide) QC limits?	✓			
Were all initial calibration correlation coefficients > 0.995? (Level IV only)	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	✓			
IV. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were < 5X the RL.		✓		
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			
VI. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analysies have duplicate injections? (Level IV only)			✓	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			✓	
Were analytical spike recoveries within the 85-115% QC limits?			✓	

LDC #: 22575 B4
SDG #: QG62

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: ✓

Validation Area	Yes	No	NA	Findings/Comments
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?		✓		
Were all percent differences (%Ds) < 10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
VIII. Internal Standards (EPA SW 846 Method 6020)				
Were all the percent recoveries (%R) within the 30-120% of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
X. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 22575B4
SDG #: QG62

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: MG
2nd reviewer: [illegible]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1→3	sed	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
4→15	↓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
QC 16,17	↓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
ICP Trace	sed	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
ICP-MS	↓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻,

Comments: Mercury by CVAA if performed

LDC #: [illegible]
SDG #: QG62

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000) Soil preparation factor applied: 50x
Sample Concentration units, unless otherwise noted: mg/kg Associated Samples: 1→3, 17 (>10x)

					Sample Identification									
Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Blank Action Limit			No samples were qualified							
Al														
Sb														
As														
Ba														
Be														
Cd														
Ca														
Cr														
Co														
Cu	0.3			3.00										
Fe														
Pb														
Mg														
Mn														
Hg														
Mo														
Ni														
K														
Se														
Ag														
Na														
Tl														
V														
Zn	1.			10,00										
Sn														
B														

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results wer qualified as not detected, "U".
Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

BLNKSMP.4SW

LDC #: 22575B4
SDG #: QG62

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	16	sed	Sb	12.8 (70-130)	1→3, 17	* J-/UJ/A

Comments: post digestion spike in limit for Sb

MS.4S2

LDC #: 22575B4
SDG #: QG62

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
1	17	sed	Ni	30.8 (≤ 30)		1→3, 17	J / UJ / A

Comments:

DUP.4S2

LDC#: 22575B4
SDG#: QG62

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 6010B/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg)		RPD (≤ 50)	
	2	3		
Arsenic	18.5	16.7	10	
Chromium	20	25.8	25	
Cobalt	6.7	8.6	25	
Copper	31.4	39.7	23	
Lead	10	15	40	
Mercury	0.09	0.10	11	
Nickel	16	21	27	
Vanadium	46.9	60.7	26	
Zinc	62	80	25	

V:\FIELD DUPLICATES\FD_inorganic\22575B4.WPD

LDC #: 22575B4
SDG #: QG62

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found / True x 100 Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
1102 ICV	ICP (Initial calibration)	Cd	1015.	1000.0	101.5	101.5	Y
	GFAA (Initial calibration)						
1205 ICV	CVAA (Initial calibration)	Hg	7.66	8.0	95.8	95.8	
1906 CCV8	ICP (Continuing calibration)	Cu	1044.	1000.0	104.4	104.4	
	GFAA (Continuing calibration)						
1354 CCV7	CVAA (Continuing calibration)	Hg	3.92	4.0	98.0	98.0	
1124 ICV	ICP/MS (Initial calibration)	Sb	49.743	50.0	99.5	99.5	
1725 CCV7	ICP/MS (Continuing calibation)	Tl	49.328	50.0	98.7	98.7	

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22575B4
SDG #: QG62

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: MG
2nd Reviewer: ✓

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
1858 ICSAB3	ICP interference check	Zn	965.5 (µg/L)	1000. (µg/L)	96.6	96.6	Y
1746 LCS	Laboratory control sample	As	27.11 (mg/kg)	25.0 (mg/kg)	108	108	↓
1916 16	Matrix spike	Se	(SSR-SR) 100.11 (mg/kg)	107. (mg/kg)	93.6	93.5	↓
1953/1946 17	Duplicate	Co	5.07 (mg/kg)	4.01 (mg/kg)	23.3	24.2	↓
—	ICP serial dilution	—	—	—	—	—	—

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

TOTCLC.4SW

LDC #: 22575B4
SDG #: QG62

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd reviewer: ✓

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for #2. As were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

$$\frac{(9.795\ \mu g/L)(0.050\ L)(20)}{(1.051\ g)(0.505)} = 18.455\ \frac{\mu g}{g} \text{ or } \frac{mg}{Kg}$$

Sample ID	Analyte	Reported Concentration (mg/Kg)	Calculated Concentration (mg/Kg)	Acceptable (Y/N)
2	As	18.5	18.5	Y
	Cr	20.	20.0	
	Co	6.7	6.7	
	Cu	31.4	31.4	
	Pb	10.	10.4	
	Hg	0.09	0.094	
	Ni	16.	16.3	
	V	46.9	46.9	
	Zn	62.	62.1	

RECALC.4S2

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22575

Wet Chemistry

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	January 11 through January 12, 2010
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Wet Chemistry
Validation Level:	EPA Level IV
Laboratory:	Analytical Resources, Inc.
Sample Delivery Groups (SDG):	QF92

Sample Identification

LDW-SS502-010-comp
LDW-SS503-043-comp
LDW-SS529-041-comp
LDW-SS531-010-comp
LDW-SS533-043-comp
LDW-SS544-010-comp
LDW-SS547-010
LDW-SS520-010
LDW-SS502-010-compMS
LDW-SS502-010-compDUP
LDW-SS502-010-compTRP
LDW-SS544-010-compDUP
LDW-SS544-010-compTRP

Introduction

This data review covers 13 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per the Plumb Method for Total Organic Carbon, PSEP Method for Particle Size, and EPA Method 160.3 for Percent Solids.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were not required by the method.

V. Duplicates/Triplicates

Duplicate (DUP) and triplicate (TRP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Sample Result Verification

All sample result verifications were acceptable.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Wet Chemistry - Data Qualification Summary - SDG QF92

No Sample Data Qualified in this SDG

Lower Duwamish Waterway Group
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG QF92

No Sample Data Qualified in this SDG

LDC #: 22575A6

SDG #: QF92

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Level IV

Date: 2-16-10

Page: 1 of 1

Reviewer: MG

2nd Reviewer: ✓

METHOD: TOC (Plumb Method), Particle Size (PSEP Method), Total Solids (EPA Method 160.3)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times SM	SW ~~A~~	Sampling dates: 1-11-10 through 1-12-10
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS
V	Duplicates	A	DUP/TRP
VI.	Laboratory control samples	A	LCS
VII.	Sample result verification	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: all sediment

1	LDW-SS502-010-comp	11	LDW-SS502-010-comp~~DUP~~ TRP	21		31	
2	LDW-SS503-043-comp	12	LDW-SS544-010-compDUP	22		32	
3	LDW-SS529-041-comp	13	LDW-SS544-010-compTRP	23		33	
4	LDW-SS531-010-comp	14	PBS	24		34	
5	LDW-SS533-043-comp	15		25		35	
6	LDW-SS544-010-comp	16		26		36	
7	LDW-SS547-010	17		27		37	
8	LDW-SS520-010	18		28		38	
9	LDW-SS502-010-compMS	19		29		39	
10	LDW-SS502-010-comp~~MSD~~ DUP	20		30		40	

Notes:

LDC #: 22575A6
SDG #: QF92

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: V

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.		✓		
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)	✓			
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 22575A6
SDG #: QF92

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: [illegible]
SDG #: QF92

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: MG
2nd reviewer: [illegible]

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1→8	Sed	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
QC 9→11	↓	pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 (TOC) CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
		pH Br Cl F NO_3 NO_2 SO_4 O-PO_4 ClO_3 TOC CN NH_3 TKN CEC S Cr^{6+}
1→8		Moisture Density Porosity Organic Solids Gravity (Particle size) (Total Solids)
QC 10,11		Moisture Density Porosity Organic Solids Gravity Particle size (Total Solids)
↓ 12,13	↓	Moisture Density Porosity Organic Solids Gravity (Particle size)
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size
		Moisture Density Porosity Organic Solids Gravity Particle size

Comments:

LDC #: 22575A6
SDG #: QF92

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: MG
2nd reviewer: ✓

All circled dates have exceeded the technical holding time.
Y N (N/A) Were all samples preserved as applicable to each method ?
(Y) N N/A Were all cooler temperatures within validation criteria?

Method:		160.3					
Parameters:		Total Solids					
Technical holding time:		7 day					
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
1	1-11-10	1-19-10	(8 day)				no qual * ~~J/UJ/P~~
2	↓	↓	↓				↓
3							
7							
8							
10							
11	↓	↓	↓				↓

* using professional judgment, data were not qualified. delay in analysis is due to compositing scheme agreement w/ EPA

HT.6

LDC #: 22575A6
SDG #: QF92

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd Reviewer: ✓

METHOD: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of TOC was recalculated. Calibration date: 1-4-10

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found / True x 100 Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte		µg C (units)	Area (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	TOC	Blank	0.0 (µg)	58147	r^2=0.99965	r^2=0.99965	Y
Calibration verification		Standard 1	8.0 ( )	1770583			
		Standard 2	20.0 ( )	4611982			
		Standard 3	40.0 ( )	9454085			
		Standard 4	100.0 ( )	24563398			
		Standard 5	-	-			
		Standard 6	-	-			
		Standard 7	-	-			
Calibration verification	TOC	ICV	998. (mg/kg)	1000. (mg/kg)	99.8	99.80	
Calibration verification	TOC	CCV1	1028. (mg/kg)	1000. (mg/kg)	102.8	102.80	
Calibration verification	—	—	—	—	—	—	—

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

CALCLC.6

LDC #: 22575A6
SDG #: QF92

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: MG
2nd Reviewer: ✓

METHOD: Inorganics, Method see cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	TOC	0.0998 (%)	0.100 (%)	99.8	100.0	Y
9	Matrix spike sample	TOC	(SSR-SR) 2.13 (%)	1.86 (%)	114.5	119.1	↓
1/10/11	Duplicate sample	Total Solids	Samp 72.8 (%)	Dup. 74.0 (%)	TRP 72.5 (%)	RSD recalc. 1.1 / report 1.1	↓

Comments: Refer to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

TOTCLC.6

LDC #: 22575A6
SDG #: QF92

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd reviewer: [illegible]

METHOD: Inorganics, Method see cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for #1, TOC reported with a positive detect were recalculated and verified using the following equation:

Concentration =

for µg C: $y = mx + b$
where $m = 2.464e+05$
$b = -186465.$
burn wt = 2.8 mg or 0.0028g

Recalculation:
$12064713 = 2.464e+05(x) - 186465$
49.72 µg C $= x$
then $\frac{49.72\ \mu g}{0.0028\ g} = 17757\ \frac{\mu g}{g}$ or $\frac{mg}{kg}$ or 1.776 %

#	Sample ID	Analyte	Reported Concentration (%)	Calculated Concentration (%)	Acceptable (Y/N)
1	1	Total Solids	72.80	72.77	Y
		TOC	1.82	1.78	
		% Finer Than			
		4750. (µm)	96.2	96.2	
		2000. ( )	92.1	92.1	
		1000. ( )	87.0	87.0	
		500. ( )	68.6	68.6	
		250. ( )	29.0	29.0	
		125. ( )	9.7	9.6	
		63. ( )	6.0	6.0	
		31.0 ( )	4.8	4.9	
		15.6 ( )	4.0	4.2	
		7.8 ( )	3.5	3.6	
		3.9 ( )	2.8	2.9	
		2.0 ( )	1.9	2.0	
		1.0 ( )	1.1	1.3	

Note:

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

April 30, 2010

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed is the revised validation report for the fraction listed below. This SDG was received on February 19, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 22612:

SDG #	**Fraction**
DPWG31853/WG31628	Dioxins/Dibenzofurans

The data validation was performed under EPA Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005
- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005, Dioxin/Furan Addendum, December 2009
- EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin(PCDD) and Polychlorinated Dibenzofuran(PCDF) Data, Revision 2.0, January 1996
- USEPA, Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Diobenzofurans Data Review, September 2005

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Data Validation Operations Manager/Senior Chemist

V:\LOGIN\Windward\Duwamish\22612COV-R.wpd

1 WEEK TAT

Attachment 1

EDD

LDC #22612 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

PO# Axys07-04

LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (8290)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG31853/WG31628	02/19/10	02/26/10	0	12																														
Total	T/SC			0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

22612ST.wpd

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22612

Dioxins/Dibenzofurans

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	December 15 through December 16, 2009
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Dioxins/Dibenzofurans
Validation Level:	EPA Level IV
Laboratory:	AXYS Analytical Services Ltd.
Sample Delivery Group (SDG):	DPWG31853/WG31628

Sample Identification

LDW-SS523-010
LDW-SS530-010
LDW-SS509-010
LDW-SS501-010
LDW-SS505-010
LDW-SS507-010
LDW-SS510-010
LDW-SS514-010
LDW-SS515-010
LDW-SS516-010
LDW-SS517-010
LDW-SS525-010
LDW-SS505-010DUP

Introduction

This data review covers 13 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1613 for Polychlorinated Dioxins/Dibenzofurans.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) Data (Revision 2.0, January 31, 1996) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between ^{13}C-2,3,7,8-TCDD and ^{13}C-1,2,3,4-TCDD was less than or equal to 25%.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all native compounds and less than or equal to 35.0% for all labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

The minimum S/N ratio was technically acceptable.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration concentrations were within the QC limits.

The ion abundance ratios for all PCDDs and PCDFs were within method criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks.

Method blank results flagged "K" by the laboratory as estimated maximum possible concentration (EMPC) were considered not detected.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VII. Ongoing Precision & Recovery (OPR) and Standard Reference Material (SRM) Samples

Percent recoveries (%R) of the ongoing precision and recovery samples were within QC limits.

Standard reference material samples were analyzed at the required frequency.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG DPWG31853/WG31628	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
All samples in SDG DPWG31853/WG31628	2,3,7,8-TCDF (from DB-5)	R	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Data Qualification Summary - SDG DPWG31853/WG31628

SDG	Sample	Compound	Flag	A or P	Reason
DPWG31853/ WG31628	LDW-SS523-010 LDW-SS530-010 LDW-SS509-010 LDW-SS501-010 LDW-SS505-010 LDW-SS507-010 LDW-SS510-010 LDW-SS514-010 LDW-SS515-010 LDW-SS516-010 LDW-SS517-010 LDW-SS525-010 LDW-SS505-010DUP	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A	Compound quantitation and CRQLs (EMPC)
DPWG31853/ WG31628	LDW-SS523-010 LDW-SS530-010 LDW-SS509-010 LDW-SS501-010 LDW-SS505-010 LDW-SS507-010 LDW-SS510-010 LDW-SS514-010 LDW-SS515-010 LDW-SS516-010 LDW-SS517-010 LDW-SS525-010 LDW-SS505-010DUP	2,3,7,8-TCDF (from DB-5)	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG DPWG31853/WG31628

No Sample Data Qualified in this SDG

LDC #: 22612A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 2/22/10
SDG #: DPWG31853/WG31628 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services Ltd. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12/15 - 16/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	20/35
IV.	Routine calibration	A	QC limits
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates /DUP	N /A	
VII.	Laboratory control samples	A	OPR. CRM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	~~A~~ SW	
XII.	System performance	A	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:
All Seds

1 1	LDW-SS523-010	11 2	LDW-SS517-010	21 1	WG31628-10 1	31	
2 2	LDW-SS530-010	12 2	LDW-SS525-010	22		32	
3 3	LDW-SS509-010	~~13~~ 3 A	LDW-SS505-010DUP	23		33	
4 2	LDW-SS501-010	14		24		34	
5 3	LDW-SS505-010	15		25		35	
6 ~~3~~ 1	LDW-SS507-010	16		26		36	
7 2	LDW-SS510-010	17		27		37	
8 3	LDW-SS514-010	18		28		38	
9 2	LDW-SS515-010	19		29		39	
10 2	LDW-SS516-010	20		30		40	

Notes:

DC #: 22612A1
DG #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: [illegible]

Method: Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for unlabeled standards and ≤ 3~~0~~5% for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Did ~~Were~~ all percent differences (%D) ~~≤ 20%~~ for unlabeled standards and ~~≤ 30%~~ for labeled standards? meet QC limits	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		DUP
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

)C #: 22612A21
)G #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 3
Reviewer: 9
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 40-135% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks $\geq$ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard $\geq$ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within $\pm$ 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N $\geq$ 2.5, at $\pm$ seconds RT) detected in the corresponding PCDPE channel?			✓	
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		

)C #: 226121
)G #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 22612A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date:_____ **Blank analysis date:**_____
Conc. units:_____ Associated Samples:_____

Compound	Blank ID	Sample Identification								
All ZMPC results		—	qual	U						

Blank extraction date:_____ **Blank analysis date:**_____
Conc. units:_____ Associated Samples:_____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 2261-A2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		all	EMPC results	all	U

Comments: See sample calculation verification worksheet for recalculations

COMQUA90 21

LDC # [illegible]
SDG # See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	H on OB-5	all	R/A

Comments:

C:\WPDOCS\WRK\DIOXIN90\OVR90.21

SDG #: see cover

Initial Calibration Calculation Verification

Reviewer: 9
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method ~~8290~~ 1613)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	1CA2	11/19/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	0.83	0.83	0.83	2.19	2.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	0.87	0.82	0.84	4.39	4.26
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	0.79	0.78	0.78	1.51	1.45
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	1.07	1.13	1.13	3.27	3.52
			OCDF (^{13}C-OCDD)	0.78	0.78	0.75	0.75	19.8	20.0
2	1CA6	12/23/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	0.92	0.91	0.91	4.69	4.56
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Page: 1 of ___
Reviewer: [signature]
2nd Reviewer: [signature]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DXOM-015	2/2/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.6	10.6		
	S=6		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.2	10.1		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	53.0	53.0		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	45.9	46.1		
			OCDF (^{13}C-OCDD)	0.98	117	116		
2	DBOB-034	2/3/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	11.8	11.8		
	S=2		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DXOM-015	2/3/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.5	10.6		
	S=17		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	10.1	10.0		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	53.8	53.3		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	45.4	45.6		
			OCDF (^{13}C-OCDD)	0.78	116	115		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: [illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DBOB-033	2/7/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	11.1	11.8		
	S=2		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
2	DXOM-015	2/3/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.5	10.5		
	S=28		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.85	10.1	10.4		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	53.9	53.5		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	45.7	45.8		
			OCDF (^{13}C-OCDD)	0.78	120	119		
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22612A-1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: [illegible]

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WF31628-102

Compound	Spike Added (ng/mL)		Spiked Sample Concentration (ng/mL)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	10.0	NA	9.68	NA	96.8	96.8				
1,2,3,7,8-PeCDD	50.0		50.8		97.7	97.7				
1,2,3,4,7,8-HxCDD	56.5		51.3		90.8	90.8				
1,2,3,4,7,8,9-HpCDF	50.0		43.9		87.9	87.8				
OCDF	104		112		108	108				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Descriptor	Accurate mass[a]	Ion ID	Elemental Composition	Analyte	Descriptor	Accurate Mass[a]	Ion ID	Elemental Composition	Analyte
1	303.9016	M	$C_{12}H_4{}^{35}Cl_4O$	TCDF	4	407.7818	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	305.8987	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10$	TCDF		409.7788	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O$	HpCDF
	315.9419	M	$^{13}C_{12}H_4{}^{35}Cl_4O$	TCDF (S)		417.8250	M	$^{13}C_{12}H^{35}Cl_7O$	HpCDF (S)
	317.9389	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDF (S)		419.8220	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	319.8965	M	$C_{12}H_4{}^{35}Cl_4O_2$	TCDD		423.7767	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD
	321.8936	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10_2$	TCDD		425.7737	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD
	331.9368	M	$^{13}C_{12}H_4{}^{35}Cl_4O_2$	TCDD (S)		435.8169	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD (S)
	333.9338	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO_2$	TCDD (S)		437.8140	M+4	$^{13}C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD (S)
	375.8364	M+2	$C_{12}H_4{}^{35}Cl_5{}^{37}ClO$	HxCDPE		479.7165	M+4	$C_{12}H^{35}Cl_7{}^{37}Cl_2O$	NCDPE
	[354.9792]	LOCK	C_9F_{13}	PFK		[430.9728]	LOCK	C_9F_{17}	PFK
2	339.8597	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PeCDF	5	441.7428	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO$	OCDF
	341.8567	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF		443.7399	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O$	OCDF
	351.9000	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}C10$	PeCDF (S)		457.7377	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD
	353.8970	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF (S)		459.7348	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD
	355.8546	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD		469.7780	M+2	$^{13}C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD (S)
	357.8516	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD		471.7750	M+4	$^{13}C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD (S)
	367.8949	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD (S)		513.6775	M+4	$C_{12}{}^{35}Cl_8{}^{37}Cl_2O$	DCDPE
	369.8919	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD (S)		[422.9278]	LOCK	$C_{10}F_{17}$	PFK
	409.7974	M+2	$C_{12}H_3{}^{35}Cl_6{}^{37}ClO$	HpCDPE					
	[354.9792]	LOCK	C_9F_{13}	PFK					
3	373.8208	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF					
	375.8178	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDF					
	383.8639	M	$^{13}C_{12}H_2{}^{35}Cl_6O$	HxCDF (S)					
	385.8610	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF (S)					
	389.8156	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD					
	391.8127	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD					
	401.8559	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD (S)					
	403.8529	M+4	$^{13}C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD (S)					
	445.7555	M+4	$C_{12}H_2{}^{35}Cl_6{}^{37}Cl_2O$	OCDPE					
	[430.9728]	LOCK	C_9F_{17}	PFK					

(a) The following nuclidic masses were used:

H = 1.007825	O = 15.994915
C = 12.000000	^{35}Cl = 34.968853
^{13}C = 13.003355	^{37}Cl = 36.965903
F = 18.9984	

S = internal/recovery standard

LDC #: 22612A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd reviewer: JL

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
RRF	=	Relative Response Factor (average) from the initial calibration
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, F:

Conc. = (8.4Tes)(2000)( ) / (4.TTes)(1.0T)(10.6)( )

= 313.1 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Windward Environmental, LLC
200 West Mercer Street, Suite 401
Seattle, WA 98119
ATTN: Ms. Marina Mitchell

April 30, 2010

SUBJECT: Lower Duwamish Waterway Group, Data Validation

Dear Ms. Mitchell,

Enclosed is the revised validation report for the fraction listed below. This SDG was received on March 3, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 22683:

SDG #	**Fraction**
DPWG31962/WG31619	Dioxins/Dibenzofurans

The data validation was performed under EPA Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005
- Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan, January 2005, Dioxin/Furan Addendum, December 2009
- EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin(PCDD) and Polychlorinated Dibenzofuran(PCDF) Data, Revision 2.0, January 1996
- USEPA, Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Diobenzofurans Data Review, September 2005

Please feel free to contact us if you have any questions.

Sincerely,

Stella S. Cuenco
Data Validation Operations Manager/Senior Chemist

V:\LOGIN\Windward\Duwamish\22683COV-R.wpd

1 WEEK TAT

Attachment 1

EDD

LDC #22683 (Windward Environmental, LLC - Seattle WA / Lower Duwamish Waterway Group)

PO# Axys07-04

LDC	SDG#	DATE REC'D	(3) DATE DUE	Dioxins (8290)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	DPWG31962/WG31619	03/03/10	03/10/10	0	8																														

Shaded cells indicate Level IV validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

22683ST.wpd

Lower Duwamish Waterway Group
Data Validation Reports
LDC #22683

Dioxins/Dibenzofurans

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Lower Duwamish Waterway Group
Collection Date:	January 11 through January 12, 2010
LDC Report Date:	April 29, 2010
Matrix:	Sediment
Parameters:	Dioxins/Dibenzofurans
Validation Level:	EPA Level IV
Laboratory:	AXYS Analytical Services Ltd.
Sample Delivery Group (SDG):	DPWG31962/WG31619

Sample Identification

LDW-SS502-010-COMP
LDW-SS503-043-COMP
LDW-SS529-041-COMP
LDW-SS531-010-COMP
LDW-SS533-043-COMP
LDW-SS544-010-COMP
LDW-SS547-010
LDW-SS520-010
LDW-SS520-010DUP

Introduction

This data review covers 9 sediment samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1613 for Polychlorinated Dioxins/Dibenzofurans.

This review follows the Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway Quality Assurance Project Plan (QAPP) (January 14, 2005), Final Surface Sediment Sampling for Chemical Analyses and Toxicity Testing of the Lower Duwamish Waterway QAPP, Dioxin/Furan Addendum (December 15, 2009), EPA Region 10 SOP for the Validation of Polychlorinated Dibenzodioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) Data (Revision 2.0, January 31, 1996) and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

The following are definitions of the data qualifiers:

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

- J1 Blank Contamination: Indicates possible high bias and/or false positives.
- J2 Calibration Range exceeded: Indicates possible low bias.
- J3 Holding times not met: Indicates low bias for most analytes.
- J4 Other QC parameters outside control limits: bias not readily determined.
- J5 Other QC parameters outside control limits. The reported results appear to be biased high. The actual value of target compound in the sample may be lower than the value reported by the laboratory.
- J6 Other QC parameters outside control limits. The reported results appear to be biased low. The actual value of target compound in the sample may be higher than the value reported by the laboratory.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between ^{13}C-2,3,7,8-TCDD and ^{13}C-1,2,3,4-TCDD was less than or equal to 25%.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for all native compounds and less than or equal to 35.0% for all labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

The minimum S/N ratio was technically acceptable.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration concentrations were within the QC limits.

The ion abundance ratios for all PCDDs and PCDFs were within method criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
WG31619-101	1/25/10	OCDD	0.123 pg/g	All samples in SDG DPWG31962/WG31619

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

Method blank results flagged "K" by the laboratory as estimated maximum possible concentration (EMPC) were considered not detected.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Compound	RPD (Limits)	Difference (Limits)	Flag	A or P
LDW-SS520-010DUP (LDW-SS520-010 LDW-SS520-010DUP)	2,3,4,6,7,8-HxCDF	62.7 (≤50)	-	J (all detects)	A

VII. Ongoing Precision & Recovery (OPR) and Standard Reference Material (SRM) Samples

Percent recoveries (%R) of the ongoing precision and recovery samples were within QC limits.

Standard reference material samples were analyzed at the required frequency.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

All target compound identifications were within validation criteria.

XI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG DPWG31962/WG31619	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A

XII. System Performance

The system performance was acceptable.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
All samples in SDG DPWG31962/WG31619	2,3,7,8-TCDF (from DB-5)	R	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

XV. Field Blanks

No field blanks were identified in this SDG.

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Data Qualification Summary - SDG DPWG31962/WG31619

SDG	Sample	Compound	Flag	A or P	Reason
DPWG31962/ WG31619	LDW-SS520-010 LDW-SS520-010DUP	2,3,4,6,7,8-HxCDF	J (all detects)	A	Duplicate sample analysis (RPD)
DPWG31962/ WG31619	LDW-SS502-010-COMP LDW-SS503-043-COMP LDW-SS529-041-COMP LDW-SS531-010-COMP LDW-SS533-043-COMP LDW-SS544-010-COMP LDW-SS547-010 LDW-SS520-010 LDW-SS520-010DUP	All TCL compounds flagged "K" by the laboratory as estimated maximum possible concentration.	U	A	Compound quantitation and CRQLs (EMPC)
DPWG31962/ WG31619	LDW-SS502-010-COMP LDW-SS503-043-COMP LDW-SS529-041-COMP LDW-SS531-010-COMP LDW-SS533-043-COMP LDW-SS544-010-COMP LDW-SS547-010 LDW-SS520-010 LDW-SS520-010DUP	2,3,7,8-TCDF (from DB-5)	R	A	Overall assessment of data

Lower Duwamish Waterway Group
Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG DPWG31962/WG31619

No Sample Data Qualified in this SDG

LDC #: 22683A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 3/4/10
SDG #: DPWG31962/WG31619 Level IV Page: 1 of 1
Laboratory: AXYS Analytical Services Ltd. Reviewer: 2
2nd Reviewer: N

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/11-12/10
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates DUP	SW	
VII.	Laboratory control samples	A	OPR. CFM
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	A	
XI.	Compound quantitation and CRQLs	SW	
XII.	System performance	A	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	N	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples:
All seds

1	LDW-SS502-010-COMP	11	W#31619-101	21		31	
2	LDW-SS503-043-COMP	12		22		32	
3	LDW-SS529-041-COMP	13		23		33	
4	LDW-SS531-010-COMP	14		24		34	
5	LDW-SS533-043-COMP	15		25		35	
6	LDW-SS544-010-COMP	16		26		36	
7	LDW-SS547-010	17		27		37	
8	LDW-SS520-010	18		28		38	
9	LDW-SS520-010DUP	19		29		39	
10		20		30		40	

Notes:

DC #: 22683A21
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 3
Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
III. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% 13% for unlabeled standards and ~~≤ 30%~~ for labeled standards?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IV. Continuing calibration				
Was a routine calibration performed at the beginning and end of each 12 hour period?	✓			
Were all ~~percent differences (%D)~~ conc meet QC criteria ≤ 20% for unlabeled standards and ≤ 30% for labeled standards?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet?	✓			
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		Dup
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

IC #: 22683A21
DG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: [illegible]
2nd Reviewer: [illegible]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
VIII. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
IX. Internal standards				
Were internal standard recoveries within the 40-135% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks $\geq$ 10?	✓			
X. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard $\geq$ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within $\pm$ 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N $\geq$ 2.5, at $\pm$ seconds RT) detected in the corresponding PCDPE channel?			✓	
Was an acceptable lock mass recorded and monitored?	✓			
XI. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		

)C #: 22683A21
)G #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: A

Validation Area	Yes	No	NA	Findings/Comments
Target compounds were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 22683A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 1/25/10 **Blank analysis date:** 2/11/10
Conc. units: ng/kg Associated Samples: All (>5x)

Compound	Blank ID	Sample Identification								
WG-31619-10		1								
4	0.123									
8 qual	2MPC	-	U							

Blank extraction date:_____ **Blank analysis date:**_____
Conc. units:_____ Associated Samples:_____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 2260 [illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have a associated MS/MSD. Soil / Water.

Y (N) N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N (N/A) Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		9	M	( )	( )	62.7 (≤50)	8, 9	Values / A
				( )	( )	( )		
				( )	( )	( )		
		No MS/MSD	client	specified	)	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 22683A1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	ZMPC results	All	U

Comments: See sample calculation verification worksheet for recalculations

LDC #: [illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	H on DB-5	All	R/A

Comments:

C:\WPDOCS\WRK\DIOXIN90\OVR90.21

LDC #: 22683A2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of compound, A_{is} = Area of associated internal standard, C_x = Concentration of compound, C_{is} = Concentration of internal standard
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X) — S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported RRF (CS3 std)	Recalculated RRF (CS3 std)	Reported %RSD	Recalculated %RSD
1	ICAL	11/19/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	0.83	0.83	0.83	2.19	2.31
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.87	0.87	0.84	0.84	4.39	4.26
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	0.79	0.78	0.78	1.51	1.45
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	1.07	1.13	1.13	3.27	3.52
			OCDF (^{13}C-OCDD)	0.78	0.78	0.75	0.75	19.8	20.0
2	ICAL	12/23/09	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	0.92	0.91	0.91	4.69	4.58
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)						
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)						
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)						
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)						
			OCDF (^{13}C-OCDD)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Routine Calibration Results Verification

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DXOM-019	2/11/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.4	10.4		
	S=2		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.85	10.4	10.3		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	53.2	53.0		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	45.9	46.0		
			OCDF (^{13}C-OCDD)	0.78	113	113		
2	DBOB-039	2/11/10	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.92	12.9	13.0		
	S=2		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					
3	DXOM-019		2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	0.83	10.7	10.6		
	S=12		2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	0.85	10.8	10.7		
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	0.79	52.2	52.8		
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.07	45.5	45.4		
			OCDF (^{13}C-OCDD)	0.78	115	115		

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: [illegible]
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: [illegible]
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: WF31619-102

Compound	Spike Added (ng/ml)		Spiked Sample Concentration (ng/ml)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
2,3,7,8-TCDD	10.0	NA	10.6	NA	106	106				
1,2,3,7,8-PeCDD	50		51.5		99.1	99.0				
1,2,3,4,7,8-HxCDD	56.5		54.1		95.7	95.7				
1,2,3,4,7,8,9-HpCDF	50.0		46.4		92.9	92.8				
OCDF	104		123		119	118				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Descriptor	Accurate mass[a]	Ion ID	Elemental Composition	Analyte	Descriptor	Accurate Mass[a]	Ion ID	Elemental Composition	Analyte
1	303.9016	M	$C_{12}H_4{}^{35}Cl_4O$	TCDF	4	407.7818	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	305.8987	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10$	TCDF		409.7788	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O$	HpCDF
	315.9419	M	$^{13}C_{12}H_4{}^{35}Cl_4O$	TCDF (S)		417.8250	M	$^{13}C_{12}H^{35}Cl_7O$	HpCDF (S)
	317.9389	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO$	TCDF (S)		419.8220	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO$	HpCDF
	319.8965	M	$C_{12}H_4{}^{35}Cl_4O_2$	TCDD		423.7767	M+2	$C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD
	321.8936	M+2	$C_{12}H_4{}^{35}Cl_3{}^{37}C10_2$	TCDD		425.7737	M+4	$C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD
	331.9368	M	$^{13}C_{12}H_4{}^{35}Cl_4O_2$	TCDD (S)		435.8169	M+2	$^{13}C_{12}H^{35}Cl_6{}^{37}ClO_2$	HpCDD (S)
	333.9338	M+2	$^{13}C_{12}H_4{}^{35}Cl_3{}^{37}ClO_2$	TCDD (S)		437.8140	M+4	$^{13}C_{12}H^{35}Cl_5{}^{37}Cl_2O_2$	HpCDD (S)
	375.8364	M+2	$C_{12}H_4{}^{35}Cl_5{}^{37}ClO$	HxCDPE		479.7165	M+4	$C_{12}H^{35}Cl_7{}^{37}Cl_2O$	NCDPE
	[354.9792]	LOCK	C_9F_{13}	PFK		[430.9728]	LOCK	C_9F_{17}	PFK
2	339.8597	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO$	PeCDF	5	441.7428	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO$	OCDF
	341.8567	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF		443.7399	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O$	OCDF
	351.9000	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}C10$	PeCDF (S)		457.7377	M+2	$C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD
	353.8970	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O$	PeCDF (S)		459.7348	M+4	$C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD
	355.8546	M+2	$C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD		469.7780	M+2	$^{13}C_{12}{}^{35}Cl_7{}^{37}ClO_2$	OCDD (S)
	357.8516	M+4	$C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD		471.7750	M+4	$^{13}C_{12}{}^{35}Cl_6{}^{37}Cl_2O_2$	OCDD (S)
	367.8949	M+2	$^{13}C_{12}H_3{}^{35}Cl_4{}^{37}ClO_2$	PeCDD (S)		513.6775	M+4	$C_{12}{}^{35}Cl_8{}^{37}Cl_2O$	DCDPE
	369.8919	M+4	$^{13}C_{12}H_3{}^{35}Cl_3{}^{37}Cl_2O_2$	PeCDD (S)		[422.9278]	LOCK	$C_{10}F_{17}$	PFK
	409.7974	M+2	$C_{12}H_3{}^{35}Cl_6{}^{37}ClO$	HpCDPE					
	[354.9792]	LOCK	C_9F_{13}	PFK					
3	373.8208	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF					
	375.8178	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O$	HxCDF					
	383.8639	M	$^{13}C_{12}H_2{}^{35}Cl_6O$	HxCDF (S)					
	385.8610	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO$	HxCDF (S)					
	389.8156	M+2	$C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD					
	391.8127	M+4	$C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD					
	401.8559	M+2	$^{13}C_{12}H_2{}^{35}Cl_5{}^{37}ClO_2$	HxCDD (S)					
	403.8529	M+4	$^{13}C_{12}H_2{}^{35}Cl_4{}^{37}Cl_2O_2$	HxCDD (S)					
	445.7555	M+4	$C_{12}H_2{}^{35}Cl_6{}^{37}Cl_2O$	OCDPE					
	[430.9728]	LOCK	C_9F_{17}	PFK					

(a) The following nuclidic masses were used:

H = 1.007825	O = 15.994915
C = 12.000000	^{35}Cl = 34.968853
^{13}C = 13.003355	^{37}Cl = 36.965903
F = 18.9984	

S = internal/recovery standard

LDC #: 22683A21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd reviewer: 11

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$$

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
RRF	=	Relative Response Factor (average) from the initial calibration
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. 1, F:

Conc. = (1.1085)(2000)( ) / (4.7285)(1.07)(10.2)( )

= 42.7 ng/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

ATTACHMENT 4

Laboratory Data Forms

METALS

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS502-010-comp
SAMPLE

Lab Sample ID: QG62A
LIMS ID: 10-1447
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Percent Total Solids: 72.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-36-0**	**Antimony**	0.3	**0.9**	
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.3	**24.3**	
3050B	01/25/10	6010B	02/01/10	7440-43-9	Cadmium	0.3	0.3	U
3050B	01/25/10	6010B	02/01/10	**7440-47-3**	**Chromium**	0.7	**18.8**	
3050B	01/25/10	6010B	02/01/10	**7440-48-4**	**Cobalt**	0.4	**5.1**	
3050B	01/25/10	6010B	02/01/10	**7440-50-8**	**Copper**	0.3	**41.3**	
3050B	01/25/10	6010B	02/01/10	**7439-92-1**	**Lead**	3	**50**	
CLP	01/25/10	7471A	01/28/10	7439-97-6	Mercury	0.03	0.03	U
3050B	01/25/10	6010B	02/01/10	**7439-98-7**	**Molybdenum**	0.7	**2.2**	
3050B	01/25/10	6010B	02/01/10	**7440-02-0**	**Nickel**	1	**15**	
3050B	01/25/10	200.8	02/02/10	7782-49-2	Selenium	0.7	0.7	U
3050B	01/25/10	6010B	02/01/10	7440-22-4	Silver	0.4	0.4	U
3050B	01/25/10	200.8	02/02/10	7440-28-0	Thallium	0.3	0.3	U
3050B	01/25/10	6010B	02/01/10	**7440-62-2**	**Vanadium**	0.4	**38.9**	
3050B	01/25/10	6010B	02/01/10	**7440-66-6**	**Zinc**	1	**148**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS502-010-comp
DUPLICATE

Lab Sample ID: QG62A
LIMS ID: 10-1447
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Antimony	200.8	0.9	1.3	36.4%	+/- 0.3	L*
Arsenic	200.8	24.3	26.3	7.9%	+/- 20%	
Cadmium	6010B	0.3 U	0.3 U	0.0%	+/- 0.3	L
Chromium	6010B	18.8	14.5	25.8%	+/- 20%	*
Cobalt	6010B	5.1	4.0	24.2%	+/- 20%	*
Copper	6010B	41.3	33.2	21.7%	+/- 20%	*
Lead	6010B	50	43	15.1%	+/- 20%	
Mercury	7471A	0.03 U	0.03 U	0.0%	+/- 0.03	L
Molybdenum	6010B	2.2	2.2	0.0%	+/- 0.7	L
Nickel	6010B	15	11	30.8%	+/- 20%	*
Selenium	200.8	0.7 U	0.7 U	0.0%	+/- 0.7	L
Silver	6010B	0.4 U	0.4 U	0.0%	+/- 0.4	L
Thallium	200.8	0.3 U	0.3 U	0.0%	+/- 0.3	L
Vanadium	6010B	38.9	29.8	26.5%	+/- 20%	*
Zinc	6010B	148	117	23.4%	+/- 20%	*

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS503-043-comp
SAMPLE

Lab Sample ID: QG62D
LIMS ID: 10-1450
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Percent Total Solids: 75.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.3	**9.6**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS508-010
SAMPLE

Lab Sample ID: QG62E
LIMS ID: 10-1451
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Percent Total Solids: 42.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.5	**11.3**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS509-010
SAMPLE

Lab Sample ID: QG62F
LIMS ID: 10-1452
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Percent Total Solids: 41.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.5	**18.1**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS523-010
SAMPLE

Lab Sample ID: QG62G
LIMS ID: 10-1453
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Percent Total Solids: 75.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.2	**5.1**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS525-010
SAMPLE

Lab Sample ID: QG62H
LIMS ID: 10-1454
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/16/09
Date Received: 01/18/10

Percent Total Solids: 77.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.2	**3.8**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS526-010
SAMPLE

Lab Sample ID: QG62I
LIMS ID: 10-1455
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/16/09
Date Received: 01/18/10

Percent Total Solids: 71.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.3	**7.5**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS527-010
SAMPLE

Lab Sample ID: QG62B
LIMS ID: 10-1448
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/17/09
Date Received: 01/18/10

Percent Total Solids: 50.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	7440-36-0	Antimony	0.4	0.4	U
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.4	**18.5**	
3050B	01/25/10	6010B	02/01/10	7440-43-9	Cadmium	0.4	0.4	U
3050B	01/25/10	6010B	02/01/10	**7440-47-3**	**Chromium**	1	**20**	
3050B	01/25/10	6010B	02/01/10	**7440-48-4**	**Cobalt**	0.6	**6.7**	
3050B	01/25/10	6010B	02/01/10	**7440-50-8**	**Copper**	0.4	**31.4**	
3050B	01/25/10	6010B	02/01/10	**7439-92-1**	**Lead**	4	**10**	
CLP	01/25/10	7471A	01/28/10	**7439-97-6**	**Mercury**	0.04	**0.09**	
3050B	01/25/10	6010B	02/01/10	7439-98-7	Molybdenum	1	1	U
3050B	01/25/10	6010B	02/01/10	**7440-02-0**	**Nickel**	2	**16**	
3050B	01/25/10	200.8	02/02/10	7782-49-2	Selenium	0.9	0.9	U
3050B	01/25/10	6010B	02/01/10	7440-22-4	Silver	0.6	0.6	U
3050B	01/25/10	200.8	02/02/10	7440-28-0	Thallium	0.4	0.4	U
3050B	01/25/10	6010B	02/01/10	**7440-62-2**	**Vanadium**	0.6	**46.9**	
3050B	01/25/10	6010B	02/01/10	**7440-66-6**	**Zinc**	2	**62**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS603-010
SAMPLE

Lab Sample ID: QG62C
LIMS ID: 10-1449
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/17/09
Date Received: 01/18/10

Percent Total Solids: 49.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	7440-36-0	Antimony	0.4	0.4	U
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.4	**16.7**	
3050B	01/25/10	6010B	02/01/10	7440-43-9	Cadmium	0.4	0.4	U
3050B	01/25/10	6010B	02/01/10	**7440-47-3**	**Chromium**	0.9	**25.8**	
3050B	01/25/10	6010B	02/01/10	**7440-48-4**	**Cobalt**	0.6	**8.6**	
3050B	01/25/10	6010B	02/01/10	**7440-50-8**	**Copper**	0.4	**39.7**	
3050B	01/25/10	6010B	02/01/10	**7439-92-1**	**Lead**	4	**15**	
CLP	01/25/10	7471A	01/28/10	**7439-97-6**	**Mercury**	0.04	**0.10**	
3050B	01/25/10	6010B	02/01/10	7439-98-7	Molybdenum	0.9	0.9	U
3050B	01/25/10	6010B	02/01/10	**7440-02-0**	**Nickel**	2	**21**	
3050B	01/25/10	200.8	02/02/10	7782-49-2	Selenium	1	1	U
3050B	01/25/10	6010B	02/01/10	7440-22-4	Silver	0.6	0.6	U
3050B	01/25/10	200.8	02/02/10	7440-28-0	Thallium	0.4	0.4	U
3050B	01/25/10	6010B	02/01/10	**7440-62-2**	**Vanadium**	0.6	**60.7**	
3050B	01/25/10	6010B	02/01/10	**7440-66-6**	**Zinc**	2	**80**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS529-041-comp
SAMPLE

Lab Sample ID: QG62J
LIMS ID: 10-1456
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Percent Total Solids: 74.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.3	**93.8**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS530-010
SAMPLE

Lab Sample ID: QG62K
LIMS ID: 10-1457
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Percent Total Solids: 61.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.3	**19.1**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS531-010-comp
SAMPLE

Lab Sample ID: QG62L
LIMS ID: 10-1469
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/12/10
Date Received: 01/18/10

Percent Total Solids: 77.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.2	**6.4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS533-043-comp
SAMPLE

Lab Sample ID: QG62M
LIMS ID: 10-1470
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/12/10
Date Received: 01/18/10

Percent Total Solids: 73.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.3	**4.3**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS544-010-comp
SAMPLE

Lab Sample ID: QG62N
LIMS ID: 10-1471
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/12/10
Date Received: 01/18/10

Percent Total Solids: 62.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.3	**6.4**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS547-010
SAMPLE

Lab Sample ID: QG62O
LIMS ID: 10-1472
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Percent Total Solids: 54.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	01/25/10	200.8	02/02/10	**7440-38-2**	**Arsenic**	0.4	**8.3**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS527-RB
SAMPLE

Lab Sample ID: QC19H
LIMS ID: 09-31229
Matrix: Water
Data Release Authorized:
Reported: 12/30/09

QC Report No: QC19-Windward Environmental, LLC
Project: LDW Dioxin Sampling
04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	µg/L	Q
200.8	12/23/09	200.8	12/29/09	7440-36-0	Antimony	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-38-2	Arsenic	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-43-9	Cadmium	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-47-3	Chromium	0.5	0.5	U
200.8	12/23/09	200.8	12/29/09	7440-48-4	Cobalt	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-50-8	Copper	0.5	0.5	U
200.8	12/23/09	200.8	12/29/09	7439-92-1	Lead	1	1	U
7470A	12/23/09	7470A	12/26/09	7439-97-6	Mercury	0.1	0.1	U
200.8	12/23/09	200.8	12/29/09	7439-98-7	Molybdenum	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-02-0	Nickel	0.5	0.5	U
200.8	12/23/09	200.8	12/29/09	7782-49-2	Selenium	0.5	0.5	U
200.8	12/23/09	200.8	12/29/09	7440-22-4	Silver	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-28-0	Thallium	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-62-2	Vanadium	0.2	0.2	U
200.8	12/23/09	200.8	12/29/09	7440-66-6	Zinc	4	4	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LDW-SS527-RB
DUPLICATE

Lab Sample ID: QC19H
LIMS ID: 09-31229
Matrix: Water
Data Release Authorized:
Reported: 12/30/09

QC Report No: QC19-Windward Environmental, LLC
Project: LDW Dioxin Sampling
04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Antimony	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Arsenic	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Cadmium	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Chromium	200.8	0.5 U	0.5 U	0.0%	+/- 0.5	L
Cobalt	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Copper	200.8	0.5 U	0.5 U	0.0%	+/- 0.5	L
Lead	200.8	1 U	1 U	0.0%	+/- 1	L
Mercury	7470A	0.1 U	0.1 U	0.0%	+/- 0.1	L
Molybdenum	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Nickel	200.8	0.5 U	0.5 U	0.0%	+/- 0.5	L
Selenium	200.8	0.5 U	0.5 U	0.0%	+/- 0.5	L
Silver	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Thallium	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Vanadium	200.8	0.2 U	0.2 U	0.0%	+/- 0.2	L
Zinc	200.8	4 U	4 U	0.0%	+/- 4	L

Reported in µg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

PAHs (SIM)

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS503-043-comp
SAMPLE

Lab Sample ID: QG62D
LIMS ID: 10-1450
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 19:10
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.9 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 24.4%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.6	38
91-57-6	2-Methylnaphthalene	4.6	22
90-12-0	1-Methylnaphthalene	4.6	31
208-96-8	Acenaphthylene	4.6	46
83-32-9	Acenaphthene	4.6	28
86-73-7	Fluorene	4.6	47
85-01-8	Phenanthrene	4.6	300
120-12-7	Anthracene	4.6	84
206-44-0	Fluoranthene	4.6	900 E
129-00-0	Pyrene	4.6	620 E
56-55-3	Benzo(a)anthracene	4.6	260
218-01-9	Chrysene	4.6	390
205-99-2	Benzo(b)fluoranthene	4.6	210
207-08-9	Benzo(k)fluoranthene	4.6	210
50-32-8	Benzo(a)pyrene	4.6	290
193-39-5	Indeno(1,2,3-cd)pyrene	4.6	150
53-70-3	Dibenz(a,h)anthracene	4.6	45
191-24-2	Benzo(g,h,i)perylene	4.6	180
132-64-9	Dibenzofuran	4.6	13

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	72.3%
d14-Dibenzo(a,h)anthracen	101%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS503-043-comp
DILUTION

Lab Sample ID: QG62D
LIMS ID: 10-1450
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 16:14
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.9 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 5.00
Percent Moisture: 24.4%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	23	41
91-57-6	2-Methylnaphthalene	23	23
90-12-0	1-Methylnaphthalene	23	34
208-96-8	Acenaphthylene	23	46
83-32-9	Acenaphthene	23	32
86-73-7	Fluorene	23	32
85-01-8	Phenanthrene	23	290
120-12-7	Anthracene	23	73
206-44-0	Fluoranthene	23	870
129-00-0	Pyrene	23	640
56-55-3	Benzo(a)anthracene	23	250
218-01-9	Chrysene	23	400
205-99-2	Benzo(b)fluoranthene	23	180
207-08-9	Benzo(k)fluoranthene	23	220
50-32-8	Benzo(a)pyrene	23	270
193-39-5	Indeno(1,2,3-cd)pyrene	23	150
53-70-3	Dibenz(a,h)anthracene	23	25
191-24-2	Benzo(g,h,i)perylene	23	190
132-64-9	Dibenzofuran	23	< 23 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	73.3%
d14-Dibenzo(a,h)anthracen	85.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS508-010
SAMPLE

Lab Sample ID: QG62E
LIMS ID: 10-1451
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 19:31
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.5 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 58.4%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.8	< 4.8 U
91-57-6	2-Methylnaphthalene	4.8	< 4.8 U
90-12-0	1-Methylnaphthalene	4.8	< 4.8 U
208-96-8	Acenaphthylene	4.8	< 4.8 U
83-32-9	Acenaphthene	4.8	< 4.8 U
86-73-7	Fluorene	4.8	< 4.8 U
85-01-8	Phenanthrene	4.8	< 4.8 U
120-12-7	Anthracene	4.8	< 4.8 U
206-44-0	Fluoranthene	4.8	< 4.8 U
129-00-0	Pyrene	4.8	< 4.8 U
56-55-3	Benzo(a)anthracene	4.8	< 4.8 U
218-01-9	Chrysene	4.8	< 4.8 U
205-99-2	Benzo(b)fluoranthene	4.8	< 4.8 U
207-08-9	Benzo(k)fluoranthene	4.8	< 4.8 U
50-32-8	Benzo(a)pyrene	4.8	< 4.8 U
193-39-5	Indeno(1,2,3-cd)pyrene	4.8	< 4.8 U
53-70-3	Dibenz(a,h)anthracene	4.8	< 4.8 U
191-24-2	Benzo(g,h,i)perylene	4.8	< 4.8 U
132-64-9	Dibenzofuran	4.8	< 4.8 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	65.3%
d14-Dibenzo(a,h)anthracen	86.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS509-010
SAMPLE

Lab Sample ID: QG62F
LIMS ID: 10-1452
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 19:52
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 3.26 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 58.2%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	15	92
91-57-6	2-Methylnaphthalene	15	58
90-12-0	1-Methylnaphthalene	15	55
208-96-8	Acenaphthylene	15	290
83-32-9	Acenaphthene	15	92
86-73-7	Fluorene	15	200
85-01-8	Phenanthrene	15	2,400 E
120-12-7	Anthracene	15	740
206-44-0	Fluoranthene	15	4,400 E
129-00-0	Pyrene	15	4,100 E
56-55-3	Benzo(a)anthracene	15	2,000 E
218-01-9	Chrysene	15	3,100 E
205-99-2	Benzo(b)fluoranthene	15	1,800 E
207-08-9	Benzo(k)fluoranthene	15	1,800 E
50-32-8	Benzo(a)pyrene	15	2,400 E
193-39-5	Indeno(1,2,3-cd)pyrene	15	1,200
53-70-3	Dibenz(a,h)anthracene	15	500
191-24-2	Benzo(g,h,i)perylene	15	1,400
132-64-9	Dibenzofuran	15	75

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	78.3%
d14-Dibenzo(a,h)anthracen	108%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS509-010
DILUTION

Lab Sample ID: QG62F
LIMS ID: 10-1452
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 16:35
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 3.26 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 5.00
Percent Moisture: 58.2%

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	**77**	**84**
91-57-6	2-Methylnaphthalene	77	< 77 U
90-12-0	1-Methylnaphthalene	77	< 77 U
208-96-8	**Acenaphthylene**	**77**	**270**
83-32-9	**Acenaphthene**	**77**	**100**
86-73-7	**Fluorene**	**77**	**170**
85-01-8	**Phenanthrene**	**77**	**2,200**
120-12-7	**Anthracene**	**77**	**640**
206-44-0	**Fluoranthene**	**77**	**4,100**
129-00-0	**Pyrene**	**77**	**4,000**
56-55-3	**Benzo(a)anthracene**	**77**	**1,800**
218-01-9	**Chrysene**	**77**	**2,600**
205-99-2	**Benzo(b)fluoranthene**	**77**	**1,600**
207-08-9	**Benzo(k)fluoranthene**	**77**	**1,600**
50-32-8	**Benzo(a)pyrene**	**77**	**2,100**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**77**	**1,200**
53-70-3	**Dibenz(a,h)anthracene**	**77**	**380**
191-24-2	**Benzo(g,h,i)perylene**	**77**	**1,400**
132-64-9	Dibenzofuran	77	< 77 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	66.7%
d14-Dibenzo(a,h)anthracen	81.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS523-010
SAMPLE

Lab Sample ID: QG62G
LIMS ID: 10-1453
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 20:13
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.5 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 21.6%

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	**4.8**	**5.7**
91-57-6	2-Methylnaphthalene	4.8	< 4.8 U
90-12-0	1-Methylnaphthalene	4.8	< 4.8 U
208-96-8	**Acenaphthylene**	**4.8**	**9.5**
83-32-9	**Acenaphthene**	**4.8**	**4.8**
86-73-7	**Fluorene**	**4.8**	**6.2**
85-01-8	**Phenanthrene**	**4.8**	**42**
120-12-7	**Anthracene**	**4.8**	**22**
206-44-0	**Fluoranthene**	**4.8**	**150**
129-00-0	**Pyrene**	**4.8**	**90**
56-55-3	**Benzo(a)anthracene**	**4.8**	**65**
218-01-9	**Chrysene**	**4.8**	**150**
205-99-2	**Benzo(b)fluoranthene**	**4.8**	**85**
207-08-9	**Benzo(k)fluoranthene**	**4.8**	**85**
50-32-8	**Benzo(a)pyrene**	**4.8**	**72**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.8**	**49**
53-70-3	**Dibenz(a,h)anthracene**	**4.8**	**17**
191-24-2	**Benzo(g,h,i)perylene**	**4.8**	**66**
132-64-9	Dibenzofuran	4.8	< 4.8 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	67.0%
d14-Dibenzo(a,h)anthracen	91.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS601-010-010
SAMPLE

Lab Sample ID: QG62P
LIMS ID: 10-1473
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 23:21
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.3 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 22.5%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.8	< 4.8 U
91-57-6	2-Methylnaphthalene	4.8	< 4.8 U
90-12-0	1-Methylnaphthalene	4.8	< 4.8 U
208-96-8	**Acenaphthylene**	**4.8**	**10**
83-32-9	**Acenaphthene**	**4.8**	**6.3**
86-73-7	**Fluorene**	**4.8**	**6.3**
85-01-8	**Phenanthrene**	**4.8**	**81**
120-12-7	**Anthracene**	**4.8**	**32**
206-44-0	**Fluoranthene**	**4.8**	**230**
129-00-0	**Pyrene**	**4.8**	**150**
56-55-3	**Benzo(a)anthracene**	**4.8**	**94**
218-01-9	**Chrysene**	**4.8**	**180**
205-99-2	**Benzo(b)fluoranthene**	**4.8**	**110**
207-08-9	**Benzo(k)fluoranthene**	**4.8**	**110**
50-32-8	**Benzo(a)pyrene**	**4.8**	**110**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.8**	**68**
53-70-3	**Dibenz(a,h)anthracene**	**4.8**	**26**
191-24-2	**Benzo(g,h,i)perylene**	**4.8**	**81**
132-64-9	Dibenzofuran	4.8	< 4.8 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	68.7%
d14-Dibenzo(a,h)anthracen	95.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS525-010
SAMPLE

Lab Sample ID: QG62H
LIMS ID: 10-1454
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/16/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 20:34
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.4 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 22.2%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.8	< 4.8 U
91-57-6	2-Methylnaphthalene	4.8	< 4.8 U
90-12-0	1-Methylnaphthalene	4.8	< 4.8 U
208-96-8	Acenaphthylene	4.8	< 4.8 U
83-32-9	**Acenaphthene**	**4.8**	**4.8**
86-73-7	**Fluorene**	**4.8**	**5.3**
85-01-8	**Phenanthrene**	**4.8**	**43**
120-12-7	**Anthracene**	**4.8**	**7.7**
206-44-0	**Fluoranthene**	**4.8**	**88**
129-00-0	**Pyrene**	**4.8**	**51**
56-55-3	**Benzo(a)anthracene**	**4.8**	**27**
218-01-9	**Chrysene**	**4.8**	**51**
205-99-2	**Benzo(b)fluoranthene**	**4.8**	**29**
207-08-9	**Benzo(k)fluoranthene**	**4.8**	**29**
50-32-8	**Benzo(a)pyrene**	**4.8**	**24**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.8**	**14**
53-70-3	**Dibenz(a,h)anthracene**	**4.8**	**5.8**
191-24-2	**Benzo(g,h,i)perylene**	**4.8**	**15**
132-64-9	**Dibenzofuran**	**4.8**	**4.8**

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	65.3%
d14-Dibenzo(a,h)anthracen	86.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS526-010
SAMPLE

Lab Sample ID: QG62I
LIMS ID: 10-1455
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/16/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 20:55
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.6 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 32.0%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.7	5.7
91-57-6	2-Methylnaphthalene	4.7	11
90-12-0	1-Methylnaphthalene	4.7	9.0
208-96-8	Acenaphthylene	4.7	13
83-32-9	Acenaphthene	4.7	26
86-73-7	Fluorene	4.7	27
85-01-8	Phenanthrene	4.7	350
120-12-7	Anthracene	4.7	100
206-44-0	Fluoranthene	4.7	930 E
129-00-0	Pyrene	4.7	520 E
56-55-3	Benzo(a)anthracene	4.7	310
218-01-9	Chrysene	4.7	510 E
205-99-2	Benzo(b)fluoranthene	4.7	290
207-08-9	Benzo(k)fluoranthene	4.7	290
50-32-8	Benzo(a)pyrene	4.7	320
193-39-5	Indeno(1,2,3-cd)pyrene	4.7	170
53-70-3	Dibenz(a,h)anthracene	4.7	70
191-24-2	Benzo(g,h,i)perylene	4.7	190
132-64-9	Dibenzofuran	4.7	15

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	75.0%
d14-Dibenzo(a,h)anthracen	97.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS526-010
DILUTION

Lab Sample ID: QG62I
LIMS ID: 10-1455
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/16/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 16:56
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.6 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 5.00
Percent Moisture: 32.0%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	24	< 24 U
91-57-6	2-Methylnaphthalene	24	< 24 U
90-12-0	1-Methylnaphthalene	24	< 24 U
208-96-8	Acenaphthylene	24	< 24 U
83-32-9	**Acenaphthene**	**24**	**26**
86-73-7	**Fluorene**	**24**	**26**
85-01-8	**Phenanthrene**	**24**	**340**
120-12-7	**Anthracene**	**24**	**97**
206-44-0	**Fluoranthene**	**24**	**900**
129-00-0	**Pyrene**	**24**	**570**
56-55-3	**Benzo(a)anthracene**	**24**	**300**
218-01-9	**Chrysene**	**24**	**500**
205-99-2	**Benzo(b)fluoranthene**	**24**	**270**
207-08-9	**Benzo(k)fluoranthene**	**24**	**270**
50-32-8	**Benzo(a)pyrene**	**24**	**300**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**24**	**160**
53-70-3	**Dibenz(a,h)anthracene**	**24**	**76**
191-24-2	**Benzo(g,h,i)perylene**	**24**	**200**
132-64-9	Dibenzofuran	24	< 24 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	65.0%
d14-Dibenzo(a,h)anthracen	96.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS529-041-comp
SAMPLE

Lab Sample ID: QG62J
LIMS ID: 10-1456
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 21:16
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.9 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 25.1%

CAS Number	Analyte	RL	Result	
91-20-3	Naphthalene	4.6	62	
91-57-6	2-Methylnaphthalene	4.6	29	
90-12-0	1-Methylnaphthalene	4.6	26	
208-96-8	Acenaphthylene	4.6	15	
83-32-9	Acenaphthene	4.6	330	
86-73-7	Fluorene	4.6	300	
85-01-8	Phenanthrene	4.6	2,800	E
120-12-7	Anthracene	4.6	2,100	E
206-44-0	Fluoranthene	4.6	13,000	E
129-00-0	Pyrene	4.6	10,000	E
56-55-3	Benzo(a)anthracene	4.6	8,300	E
218-01-9	Chrysene	4.6	7,500	E
205-99-2	Benzo(b)fluoranthene	4.6	3,400	E
207-08-9	Benzo(k)fluoranthene	4.6	3,400	E
50-32-8	Benzo(a)pyrene	4.6	4,400	E
193-39-5	Indeno(1,2,3-cd)pyrene	4.6	1,600	E
53-70-3	Dibenz(a,h)anthracene	4.6	1,100	E
191-24-2	Benzo(g,h,i)perylene	4.6	1,600	E
132-64-9	Dibenzofuran	4.6	120	

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	73.7%
d14-Dibenzo(a,h)anthracen	74.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS529-041-comp
DILUTION

Lab Sample ID: QG62J
LIMS ID: 10-1456
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 17:17
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.9 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 50.0
Percent Moisture: 25.1%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	230	< 230 U
91-57-6	2-Methylnaphthalene	230	< 230 U
90-12-0	1-Methylnaphthalene	230	< 230 U
208-96-8	Acenaphthylene	230	< 230 U
83-32-9	**Acenaphthene**	**230**	**340**
86-73-7	**Fluorene**	**230**	**300**
85-01-8	**Phenanthrene**	**230**	**2,600**
120-12-7	**Anthracene**	**230**	**2,000**
206-44-0	**Fluoranthene**	**230**	**16,000**
129-00-0	**Pyrene**	**230**	**12,000**
56-55-3	**Benzo(a)anthracene**	**230**	**7,500**
218-01-9	**Chrysene**	**230**	**7,900**
205-99-2	**Benzo(b)fluoranthene**	**230**	**3,900**
207-08-9	**Benzo(k)fluoranthene**	**230**	**3,900**
50-32-8	**Benzo(a)pyrene**	**230**	**4,900**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**230**	**2,000**
53-70-3	**Dibenz(a,h)anthracene**	**230**	**870**
191-24-2	**Benzo(g,h,i)perylene**	**230**	**2,200**
132-64-9	Dibenzofuran	230	< 230 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	D
d14-Dibenzo(a,h)anthracen	D

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS530-010
SAMPLE

Lab Sample ID: QG62K
LIMS ID: 10-1457
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 21:36
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.3 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 36.4%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.8	1,100 E
91-57-6	2-Methylnaphthalene	4.8	680 E
90-12-0	1-Methylnaphthalene	4.8	540 E
208-96-8	Acenaphthylene	4.8	150
83-32-9	Acenaphthene	4.8	1,000 E
86-73-7	Fluorene	4.8	930 E
85-01-8	Phenanthrene	4.8	7,700 E
120-12-7	Anthracene	4.8	2,000 E
206-44-0	Fluoranthene	4.8	8,300 E
129-00-0	Pyrene	4.8	7,100 E
56-55-3	Benzo(a)anthracene	4.8	3,400 E
218-01-9	Chrysene	4.8	4,200 E
205-99-2	Benzo(b)fluoranthene	4.8	2,100 E
207-08-9	Benzo(k)fluoranthene	4.8	2,100 E
50-32-8	Benzo(a)pyrene	4.8	3,200 E
193-39-5	Indeno(1,2,3-cd)pyrene	4.8	1,500 E
53-70-3	Dibenz(a,h)anthracene	4.8	640 E
191-24-2	Benzo(g,h,i)perylene	4.8	1,900 E
132-64-9	Dibenzofuran	4.8	460

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	76.3%
d14-Dibenzo(a,h)anthracen	83.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS530-010
DILUTION

Lab Sample ID: QG62K
LIMS ID: 10-1457
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 17:38
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.3 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 50.0
Percent Moisture: 36.4%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	240	1,000
91-57-6	2-Methylnaphthalene	240	660
90-12-0	1-Methylnaphthalene	240	560
208-96-8	Acenaphthylene	240	< 240 U
83-32-9	Acenaphthene	240	970
86-73-7	Fluorene	240	820
85-01-8	Phenanthrene	240	7,100
120-12-7	Anthracene	240	1,800
206-44-0	Fluoranthene	240	8,100
129-00-0	Pyrene	240	7,400
56-55-3	Benzo(a)anthracene	240	3,100
218-01-9	Chrysene	240	3,800
205-99-2	Benzo(b)fluoranthene	240	2,200
207-08-9	Benzo(k)fluoranthene	240	2,200
50-32-8	Benzo(a)pyrene	240	3,200
193-39-5	Indeno(1,2,3-cd)pyrene	240	1,600
53-70-3	Dibenz(a,h)anthracene	240	580
191-24-2	Benzo(g,h,i)perylene	240	2,300
132-64-9	Dibenzofuran	240	360

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	D
d14-Dibenzo(a,h)anthracen	D

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS531-010-comp
SAMPLE

Lab Sample ID: QG62L
LIMS ID: 10-1469
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/12/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 21:57
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.2 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 27.4%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.9	< 4.9 U
91-57-6	2-Methylnaphthalene	4.9	< 4.9 U
90-12-0	1-Methylnaphthalene	4.9	< 4.9 U
208-96-8	**Acenaphthylene**	**4.9**	**22**
83-32-9	Acenaphthene	4.9	< 4.9 U
86-73-7	Fluorene	4.9	< 4.9 U
85-01-8	**Phenanthrene**	**4.9**	**30**
120-12-7	**Anthracene**	**4.9**	**30**
206-44-0	**Fluoranthene**	**4.9**	**100**
129-00-0	**Pyrene**	**4.9**	**67**
56-55-3	**Benzo(a)anthracene**	**4.9**	**48**
218-01-9	**Chrysene**	**4.9**	**67**
205-99-2	**Benzo(b)fluoranthene**	**4.9**	**48**
207-08-9	**Benzo(k)fluoranthene**	**4.9**	**48**
50-32-8	**Benzo(a)pyrene**	**4.9**	**51**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.9**	**41**
53-70-3	**Dibenz(a,h)anthracene**	**4.9**	**15**
191-24-2	**Benzo(g,h,i)perylene**	**4.9**	**68**
132-64-9	Dibenzofuran	4.9	< 4.9 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	67.7%
d14-Dibenzo(a,h)anthracen	92.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS533-043-comp
SAMPLE

Lab Sample ID: QG62M
LIMS ID: 10-1470
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/12/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 22:18
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.7 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 28.8%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.7	< 4.7 U
91-57-6	**2-Methylnaphthalene**	**4.7**	**5.1**
90-12-0	1-Methylnaphthalene	4.7	< 4.7 U
208-96-8	Acenaphthylene	4.7	< 4.7 U
83-32-9	**Acenaphthene**	**4.7**	**7.5**
86-73-7	**Fluorene**	**4.7**	**4.7**
85-01-8	**Phenanthrene**	**4.7**	**32**
120-12-7	**Anthracene**	**4.7**	**12**
206-44-0	**Fluoranthene**	**4.7**	**88**
129-00-0	**Pyrene**	**4.7**	**79**
56-55-3	**Benzo(a)anthracene**	**4.7**	**36**
218-01-9	**Chrysene**	**4.7**	**51**
205-99-2	**Benzo(b)fluoranthene**	**4.7**	**36**
207-08-9	**Benzo(k)fluoranthene**	**4.7**	**36**
50-32-8	**Benzo(a)pyrene**	**4.7**	**42**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.7**	**27**
53-70-3	**Dibenz(a,h)anthracene**	**4.7**	**12**
191-24-2	**Benzo(g,h,i)perylene**	**4.7**	**34**
132-64-9	Dibenzofuran	4.7	< 4.7 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	66.7%
d14-Dibenzo(a,h)anthracen	91.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS544-010-comp
SAMPLE

Lab Sample ID: QG62N
LIMS ID: 10-1471
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/12/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 22:39
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.5 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 39.3%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.8	< 4.8 U
91-57-6	2-Methylnaphthalene	4.8	< 4.8 U
90-12-0	1-Methylnaphthalene	4.8	< 4.8 U
208-96-8	Acenaphthylene	4.8	< 4.8 U
83-32-9	Acenaphthene	4.8	< 4.8 U
86-73-7	Fluorene	4.8	< 4.8 U
85-01-8	**Phenanthrene**	**4.8**	**17**
120-12-7	**Anthracene**	**4.8**	**4.8**
206-44-0	**Fluoranthene**	**4.8**	**44**
129-00-0	**Pyrene**	**4.8**	**32**
56-55-3	**Benzo(a)anthracene**	**4.8**	**16**
218-01-9	**Chrysene**	**4.8**	**23**
205-99-2	**Benzo(b)fluoranthene**	**4.8**	**20**
207-08-9	**Benzo(k)fluoranthene**	**4.8**	**20**
50-32-8	**Benzo(a)pyrene**	**4.8**	**19**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.8**	**14**
53-70-3	**Dibenz(a,h)anthracene**	**4.8**	**5.7**
191-24-2	**Benzo(g,h,i)perylene**	**4.8**	**20**
132-64-9	Dibenzofuran	4.8	< 4.8 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	67.0%
d14-Dibenzo(a,h)anthracen	95.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SIM SW8270D-SIM GC/MS

Sample ID: LDW-SS547-010
SAMPLE

Lab Sample ID: QG620
LIMS ID: 10-1472
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 23:00
Instrument/Analyst: NT8/PK
GPC Cleanup: No
Silica Gel Cleanup: Yes
Alumina Cleanup: No

Sample Amount: 10.7 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 48.0%

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	4.7	< 4.7 U
91-57-6	2-Methylnaphthalene	4.7	< 4.7 U
90-12-0	1-Methylnaphthalene	4.7	< 4.7 U
208-96-8	Acenaphthylene	4.7	< 4.7 U
83-32-9	Acenaphthene	4.7	< 4.7 U
86-73-7	Fluorene	4.7	< 4.7 U
85-01-8	**Phenanthrene**	**4.7**	**50**
120-12-7	**Anthracene**	**4.7**	**11**
206-44-0	**Fluoranthene**	**4.7**	**170**
129-00-0	**Pyrene**	**4.7**	**120**
56-55-3	**Benzo(a)anthracene**	**4.7**	**62**
218-01-9	**Chrysene**	**4.7**	**92**
205-99-2	**Benzo(b)fluoranthene**	**4.7**	**71**
207-08-9	**Benzo(k)fluoranthene**	**4.7**	**71**
50-32-8	**Benzo(a)pyrene**	**4.7**	**77**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**4.7**	**51**
53-70-3	**Dibenz(a,h)anthracene**	**4.7**	**25**
191-24-2	**Benzo(g,h,i)perylene**	**4.7**	**63**
132-64-9	Dibenzofuran	4.7	< 4.7 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

d10-2-Methylnaphthalene	64.7%
d14-Dibenzo(a,h)anthracen	88.7%

SVOCS

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS502-010-comp
SAMPLE

Lab Sample ID: QG62A
LIMS ID: 10-1447
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 20:40
Instrument/Analyst: NT6/JZ
GPC Cleanup: Yes

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 30.2%

CAS Number	Analyte	RL	Result
108-95-2	**Phenol**	**20**	**17 J**
111-44-4	Bis-(2-Chloroethyl) Ether	20	< 20 U
95-57-8	2-Chlorophenol	20	< 20 U
541-73-1	1,3-Dichlorobenzene	20	< 20 U
106-46-7	1,4-Dichlorobenzene	20	< 20 U
100-51-6	Benzyl Alcohol	20	< 20 U
95-50-1	1,2-Dichlorobenzene	20	< 20 U
95-48-7	2-Methylphenol	20	< 20 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	20	< 20 U
106-44-5	4-Methylphenol	20	< 20 U
621-64-7	N-Nitroso-Di-N-Propylamine	99	< 99 U
67-72-1	Hexachloroethane	20	< 20 U
98-95-3	Nitrobenzene	20	< 20 U
78-59-1	Isophorone	20	< 20 U
88-75-5	2-Nitrophenol	99	< 99 U
105-67-9	2,4-Dimethylphenol	20	< 20 U
65-85-0	**Benzoic Acid**	**200**	**50 J**
111-91-1	bis(2-Chloroethoxy) Methane	20	< 20 U
120-83-2	2,4-Dichlorophenol	99	< 99 U
120-82-1	1,2,4-Trichlorobenzene	20	< 20 U
91-20-3	Naphthalene	20	< 20 U
106-47-8	4-Chloroaniline	99	< 99 U
87-68-3	Hexachlorobutadiene	20	< 20 U
59-50-7	4-Chloro-3-methylphenol	99	< 99 U
91-57-6	2-Methylnaphthalene	20	< 20 U
77-47-4	Hexachlorocyclopentadiene	99	< 99 U
88-06-2	2,4,6-Trichlorophenol	99	< 99 U
95-95-4	2,4,5-Trichlorophenol	99	< 99 U
91-58-7	2-Chloronaphthalene	20	< 20 U
88-74-4	2-Nitroaniline	99	< 99 U
131-11-3	Dimethylphthalate	20	< 20 U
208-96-8	**Acenaphthylene**	**20**	**17 J**
99-09-2	3-Nitroaniline	99	< 99 U
83-32-9	Acenaphthene	20	< 20 U
51-28-5	2,4-Dinitrophenol	200	< 200 U
100-02-7	4-Nitrophenol	99	< 99 U
132-64-9	Dibenzofuran	20	< 20 U
606-20-2	2,6-Dinitrotoluene	99	< 99 U
121-14-2	2,4-Dinitrotoluene	99	< 99 U
84-66-2	Diethylphthalate	20	< 20 U
7005-72-3	4-Chlorophenyl-phenylether	20	< 20 U
86-73-7	**Fluorene**	**20**	**16 J**
100-01-6	4-Nitroaniline	99	< 99 U
534-52-1	4,6-Dinitro-2-Methylphenol	200	< 200 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS502-010-comp
SAMPLE

Lab Sample ID: QG62A
LIMS ID: 10-1447
Matrix: Sediment
Date Analyzed: 01/28/10 20:40

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
NA

CAS Number	Analyte	RL	Result
86-30-6	N-Nitrosodiphenylamine	20	< 20 U
101-55-3	4-Bromophenyl-phenylether	20	< 20 U
118-74-1	Hexachlorobenzene	20	< 20 U
87-86-5	Pentachlorophenol	99	< 99 U
85-01-8	**Phenanthrene**	**20**	**190**
86-74-8	**Carbazole**	**20**	**14 J**
120-12-7	**Anthracene**	**20**	**66**
84-74-2	Di-n-Butylphthalate	20	< 20 U
206-44-0	**Fluoranthene**	**20**	**460**
129-00-0	**Pyrene**	**20**	**460**
85-68-7	**Butylbenzylphthalate**	**20**	**25**
91-94-1	3,3'-Dichlorobenzidine	99	< 99 U
56-55-3	**Benzo(a)anthracene**	**20**	**250**
117-81-7	**bis(2-Ethylhexyl)phthalate**	**20**	**150**
218-01-9	**Chrysene**	**20**	**300**
117-84-0	Di-n-Octyl phthalate	20	< 20 U
205-99-2	**Benzo(b)fluoranthene**	**20**	**180**
207-08-9	**Benzo(k)fluoranthene**	**20**	**180**
50-32-8	**Benzo(a)pyrene**	**20**	**260**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**20**	**130**
53-70-3	**Dibenz(a,h)anthracene**	**20**	**62**
191-24-2	**Benzo(g,h,i)perylene**	**20**	**140**
62-53-3	Aniline	20	< 20 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	65.6%	2-Fluorobiphenyl	77.6%
d14-p-Terphenyl	84.0%	d4-1,2-Dichlorobenzene	61.2%
d5-Phenol	79.2%	2-Fluorophenol	61.9%
2,4,6-Tribromophenol	92.3%	d4-2-Chlorophenol	65.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS527-010
SAMPLE

Lab Sample ID: QG62B
LIMS ID: 10-1448
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
NA
Date Sampled: 12/17/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 21:12
Instrument/Analyst: NT6/JZ
GPC Cleanup: Yes

Sample Amount: 25.1 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 52.8%

CAS Number	Analyte	RL	Result
108-95-2	**Phenol**	**20**	**21**
111-44-4	Bis-(2-Chloroethyl) Ether	20	< 20 U
95-57-8	2-Chlorophenol	20	< 20 U
541-73-1	1,3-Dichlorobenzene	20	< 20 U
106-46-7	1,4-Dichlorobenzene	20	< 20 U
100-51-6	Benzyl Alcohol	20	< 20 U
95-50-1	1,2-Dichlorobenzene	20	< 20 U
95-48-7	2-Methylphenol	20	< 20 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	20	< 20 U
106-44-5	4-Methylphenol	20	< 20 U
621-64-7	N-Nitroso-Di-N-Propylamine	99	< 99 U
67-72-1	Hexachloroethane	20	< 20 U
98-95-3	Nitrobenzene	20	< 20 U
78-59-1	Isophorone	20	< 20 U
88-75-5	2-Nitrophenol	99	< 99 U
105-67-9	2,4-Dimethylphenol	20	< 20 U
65-85-0	**Benzoic Acid**	**200**	**48 J**
111-91-1	bis(2-Chloroethoxy) Methane	20	< 20 U
120-83-2	2,4-Dichlorophenol	99	< 99 U
120-82-1	1,2,4-Trichlorobenzene	20	< 20 U
91-20-3	Naphthalene	20	< 20 U
106-47-8	4-Chloroaniline	99	< 99 U
87-68-3	Hexachlorobutadiene	20	< 20 U
59-50-7	4-Chloro-3-methylphenol	99	< 99 U
91-57-6	2-Methylnaphthalene	20	< 20 U
77-47-4	Hexachlorocyclopentadiene	99	< 99 U
88-06-2	2,4,6-Trichlorophenol	99	< 99 U
95-95-4	2,4,5-Trichlorophenol	99	< 99 U
91-58-7	2-Chloronaphthalene	20	< 20 U
88-74-4	2-Nitroaniline	99	< 99 U
131-11-3	Dimethylphthalate	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
99-09-2	3-Nitroaniline	99	< 99 U
83-32-9	**Acenaphthene**	**20**	**11 J**
51-28-5	2,4-Dinitrophenol	200	< 200 U
100-02-7	4-Nitrophenol	99	< 99 U
132-64-9	Dibenzofuran	20	< 20 U
606-20-2	2,6-Dinitrotoluene	99	< 99 U
121-14-2	2,4-Dinitrotoluene	99	< 99 U
84-66-2	Diethylphthalate	20	< 20 U
7005-72-3	4-Chlorophenyl-phenylether	20	< 20 U
86-73-7	**Fluorene**	**20**	**11 J**
100-01-6	4-Nitroaniline	99	< 99 U
534-52-1	4,6-Dinitro-2-Methylphenol	200	< 200 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS527-010
SAMPLE

Lab Sample ID: QG62B
LIMS ID: 10-1448
Matrix: Sediment
Date Analyzed: 01/28/10 21:12

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
NA

CAS Number	Analyte	RL	Result
86-30-6	N-Nitrosodiphenylamine	20	< 20 U
101-55-3	4-Bromophenyl-phenylether	20	< 20 U
118-74-1	Hexachlorobenzene	20	< 20 U
87-86-5	Pentachlorophenol	99	< 99 U
85-01-8	**Phenanthrene**	**20**	**67**
86-74-8	Carbazole	20	< 20 U
120-12-7	**Anthracene**	**20**	**30**
84-74-2	**Di-n-Butylphthalate**	**20**	**20**
206-44-0	**Fluoranthene**	**20**	**190**
129-00-0	**Pyrene**	**20**	**170**
85-68-7	Butylbenzylphthalate	20	< 20 U
91-94-1	3,3'-Dichlorobenzidine	99	< 99 U
56-55-3	**Benzo(a)anthracene**	**20**	**94**
117-81-7	**bis(2-Ethylhexyl)phthalate**	**20**	**320**
218-01-9	**Chrysene**	**20**	**150**
117-84-0	Di-n-Octyl phthalate	20	< 20 U
205-99-2	**Benzo(b)fluoranthene**	**20**	**87**
207-08-9	**Benzo(k)fluoranthene**	**20**	**87**
50-32-8	**Benzo(a)pyrene**	**20**	**86**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**20**	**50**
53-70-3	**Dibenz(a,h)anthracene**	**20**	**26**
191-24-2	**Benzo(g,h,i)perylene**	**20**	**54**
62-53-3	Aniline	20	< 20 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	60.8%	2-Fluorobiphenyl	72.4%
d14-p-Terphenyl	77.6%	d4-1,2-Dichlorobenzene	61.2%
d5-Phenol	80.8%	2-Fluorophenol	63.5%
2,4,6-Tribromophenol	90.1%	d4-2-Chlorophenol	66.1%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS603-010
SAMPLE

Lab Sample ID: QG62C
LIMS ID: 10-1449
Matrix: Sediment
Data Release Authorized:
Reported: 02/03/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
NA
Date Sampled: 12/17/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/28/10 21:44
Instrument/Analyst: NT6/JZ
GPC Cleanup: Yes

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 54.9%

CAS Number	Analyte	RL	Result
108-95-2	**Phenol**	**20**	**20**
111-44-4	Bis-(2-Chloroethyl) Ether	20	< 20 U
95-57-8	2-Chlorophenol	20	< 20 U
541-73-1	1,3-Dichlorobenzene	20	< 20 U
106-46-7	1,4-Dichlorobenzene	20	< 20 U
100-51-6	Benzyl Alcohol	20	< 20 U
95-50-1	1,2-Dichlorobenzene	20	< 20 U
95-48-7	2-Methylphenol	20	< 20 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	20	< 20 U
106-44-5	4-Methylphenol	20	< 20 U
621-64-7	N-Nitroso-Di-N-Propylamine	99	< 99 U
67-72-1	Hexachloroethane	20	< 20 U
98-95-3	Nitrobenzene	20	< 20 U
78-59-1	Isophorone	20	< 20 U
88-75-5	2-Nitrophenol	99	< 99 U
105-67-9	2,4-Dimethylphenol	20	< 20 U
65-85-0	**Benzoic Acid**	**200**	**62 J**
111-91-1	bis(2-Chloroethoxy) Methane	20	< 20 U
120-83-2	2,4-Dichlorophenol	99	< 99 U
120-82-1	1,2,4-Trichlorobenzene	20	< 20 U
91-20-3	Naphthalene	20	< 20 U
106-47-8	4-Chloroaniline	99	< 99 U
87-68-3	Hexachlorobutadiene	20	< 20 U
59-50-7	4-Chloro-3-methylphenol	99	< 99 U
91-57-6	2-Methylnaphthalene	20	< 20 U
77-47-4	Hexachlorocyclopentadiene	99	< 99 U
88-06-2	2,4,6-Trichlorophenol	99	< 99 U
95-95-4	2,4,5-Trichlorophenol	99	< 99 U
91-58-7	2-Chloronaphthalene	20	< 20 U
88-74-4	2-Nitroaniline	99	< 99 U
131-11-3	**Dimethylphthalate**	**20**	**180**
208-96-8	Acenaphthylene	20	< 20 U
99-09-2	3-Nitroaniline	99	< 99 U
83-32-9	**Acenaphthene**	**20**	**11 J**
51-28-5	2,4-Dinitrophenol	200	< 200 U
100-02-7	4-Nitrophenol	99	< 99 U
132-64-9	**Dibenzofuran**	**20**	**11 J**
606-20-2	2,6-Dinitrotoluene	99	< 99 U
121-14-2	2,4-Dinitrotoluene	99	< 99 U
84-66-2	Diethylphthalate	20	< 20 U
7005-72-3	4-Chlorophenyl-phenylether	20	< 20 U
86-73-7	**Fluorene**	**20**	**11 J**
100-01-6	4-Nitroaniline	99	< 99 U
534-52-1	4,6-Dinitro-2-Methylphenol	200	< 200 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS603-010
SAMPLE

Lab Sample ID: QG62C
LIMS ID: 10-1449
Matrix: Sediment
Date Analyzed: 01/28/10 21:44

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
NA

CAS Number	Analyte	RL	Result
86-30-6	N-Nitrosodiphenylamine	20	< 20 U
101-55-3	4-Bromophenyl-phenylether	20	< 20 U
118-74-1	Hexachlorobenzene	20	< 20 U
87-86-5	Pentachlorophenol	99	< 99 U
85-01-8	**Phenanthrene**	**20**	**94**
86-74-8	**Carbazole**	**20**	**11 J**
120-12-7	**Anthracene**	**20**	**31**
84-74-2	**Di-n-Butylphthalate**	**20**	**37**
206-44-0	**Fluoranthene**	**20**	**230**
129-00-0	**Pyrene**	**20**	**170**
85-68-7	Butylbenzylphthalate	20	< 20 U
91-94-1	3,3'-Dichlorobenzidine	99	< 99 U
56-55-3	**Benzo(a)anthracene**	**20**	**90**
117-81-7	**bis(2-Ethylhexyl)phthalate**	**20**	**230**
218-01-9	**Chrysene**	**20**	**140**
117-84-0	Di-n-Octyl phthalate	20	< 20 U
205-99-2	**Benzo(b)fluoranthene**	**20**	**94**
207-08-9	**Benzo(k)fluoranthene**	**20**	**94**
50-32-8	**Benzo(a)pyrene**	**20**	**94**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**20**	**45**
53-70-3	**Dibenz(a,h)anthracene**	**20**	**22**
191-24-2	**Benzo(g,h,i)perylene**	**20**	**46**
62-53-3	Aniline	20	< 20 U

Reported in μg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	63.2%	2-Fluorobiphenyl	81.6%
d14-p-Terphenyl	69.6%	d4-1,2-Dichlorobenzene	59.2%
d5-Phenol	76.0%	2-Fluorophenol	60.8%
2,4,6-Tribromophenol	73.3%	d4-2-Chlorophenol	62.9%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS527-RB
SAMPLE

Lab Sample ID: QC19H
LIMS ID: 09-31229
Matrix: Water
Data Release Authorized:
Reported: 12/28/09

QC Report No: QC19-Windward Environmental, LLC
Project: LDW Dioxin Sampling
04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Date Extracted: 12/23/09
Date Analyzed: 12/24/09 14:23
Instrument/Analyst: NT6/JZ

Sample Amount: 500 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
108-95-2	Phenol	1.0	< 1.0 U
111-44-4	Bis-(2-Chloroethyl) Ether	1.0	< 1.0 U
95-57-8	2-Chlorophenol	1.0	< 1.0 U
541-73-1	1,3-Dichlorobenzene	1.0	< 1.0 U
106-46-7	1,4-Dichlorobenzene	1.0	< 1.0 U
100-51-6	**Benzyl Alcohol**	**5.0**	**8.0**
95-50-1	1,2-Dichlorobenzene	1.0	< 1.0 U
95-48-7	2-Methylphenol	1.0	< 1.0 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	1.0	< 1.0 U
106-44-5	4-Methylphenol	1.0	< 1.0 U
621-64-7	N-Nitroso-Di-N-Propylamine	5.0	< 5.0 U
67-72-1	Hexachloroethane	1.0	< 1.0 U
98-95-3	Nitrobenzene	1.0	< 1.0 U
78-59-1	Isophorone	1.0	< 1.0 U
88-75-5	2-Nitrophenol	5.0	< 5.0 U
105-67-9	2,4-Dimethylphenol	1.0	< 1.0 U
65-85-0	Benzoic Acid	10	< 10 U
111-91-1	bis(2-Chloroethoxy) Methane	1.0	< 1.0 U
120-83-2	2,4-Dichlorophenol	5.0	< 5.0 U
120-82-1	1,2,4-Trichlorobenzene	1.0	< 1.0 U
91-20-3	Naphthalene	1.0	< 1.0 U
106-47-8	**4-Chloroaniline**	**5.0**	**60**
87-68-3	Hexachlorobutadiene	1.0	< 1.0 U
59-50-7	4-Chloro-3-methylphenol	5.0	< 5.0 U
91-57-6	2-Methylnaphthalene	1.0	< 1.0 U
77-47-4	Hexachlorocyclopentadiene	5.0	< 5.0 U
88-06-2	2,4,6-Trichlorophenol	5.0	< 5.0 U
95-95-4	2,4,5-Trichlorophenol	5.0	< 5.0 U
91-58-7	2-Chloronaphthalene	1.0	< 1.0 U
88-74-4	2-Nitroaniline	5.0	< 5.0 U
131-11-3	Dimethylphthalate	1.0	< 1.0 U
208-96-8	Acenaphthylene	1.0	< 1.0 U
99-09-2	**3-Nitroaniline**	**5.0**	**16**
83-32-9	Acenaphthene	1.0	< 1.0 U
51-28-5	2,4-Dinitrophenol	10	< 10 U
100-02-7	4-Nitrophenol	5.0	< 5.0 U
132-64-9	Dibenzofuran	1.0	< 1.0 U
606-20-2	2,6-Dinitrotoluene	5.0	< 5.0 U
121-14-2	2,4-Dinitrotoluene	5.0	< 5.0 U
84-66-2	Diethylphthalate	1.0	< 1.0 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS527-RB
SAMPLE

Lab Sample ID: QC19H
LIMS ID: 09-31229
Matrix: Water
Date Analyzed: 12/24/09 14:23

QC Report No: QC19-Windward Environmental, LLC
Project: LDW Dioxin Sampling
04-08-06-29

CAS Number	Analyte	RL	Result
7005-72-3	4-Chlorophenyl-phenylether	1.0	< 1.0 U
86-73-7	Fluorene	1.0	< 1.0 U
100-01-6	4-Nitroaniline	5.0	< 5.0 U
534-52-1	4,6-Dinitro-2-Methylphenol	10	< 10 U
86-30-6	N-Nitrosodiphenylamine	1.0	< 1.0 U
101-55-3	4-Bromophenyl-phenylether	1.0	< 1.0 U
118-74-1	Hexachlorobenzene	1.0	< 1.0 U
87-86-5	Pentachlorophenol	5.0	< 5.0 U
85-01-8	Phenanthrene	1.0	< 1.0 U
86-74-8	Carbazole	1.0	< 1.0 U
120-12-7	Anthracene	1.0	< 1.0 U
84-74-2	Di-n-Butylphthalate	1.0	< 1.0 U
206-44-0	Fluoranthene	1.0	< 1.0 U
129-00-0	Pyrene	1.0	< 1.0 U
85-68-7	Butylbenzylphthalate	1.0	< 1.0 U
91-94-1	3,3'-Dichlorobenzidine	5.0	< 5.0 U
56-55-3	Benzo(a)anthracene	1.0	< 1.0 U
117-81-7	bis(2-Ethylhexyl)phthalate	1.0	< 1.0 U
218-01-9	Chrysene	1.0	< 1.0 U
117-84-0	Di-n-Octyl phthalate	1.0	< 1.0 U
205-99-2	Benzo(b)fluoranthene	1.0	< 1.0 U
207-08-9	Benzo(k)fluoranthene	1.0	< 1.0 U
50-32-8	Benzo(a)pyrene	1.0	< 1.0 U
193-39-5	Indeno(1,2,3-cd)pyrene	1.0	< 1.0 U
53-70-3	Dibenz(a,h)anthracene	1.0	< 1.0 U
191-24-2	Benzo(g,h,i)perylene	1.0	< 1.0 U
62-53-3	**Aniline**	**1.0**	**55**
62-75-9	**N-Nitrosodimethylamine**	**5.0**	**6.4**
90-12-0	1-Methylnaphthalene	1.0	< 1.0 U

Reported in µg/L (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	86.4%	2-Fluorobiphenyl	93.2%
d14-p-Terphenyl	144%	d4-1,2-Dichlorobenzene	78.8%
d5-Phenol	38.4%	2-Fluorophenol	63.7%
2,4,6-Tribromophenol	93.9%	d4-2-Chlorophenol	71.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS527-RB
SAMPLE

Lab Sample ID: QC19H
LIMS ID: 09-31855
Matrix: Water
Data Release Authorized:
Reported: 01/11/10

QC Report No: QC19-Windward Environmental, LLC
Project: LDW DIOXIN SAMPLING
04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/29/09

Date Extracted: 12/28/09
Date Analyzed: 12/29/09 16:27
Instrument/Analyst: NT6/JZ

Sample Amount: 500 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
108-95-2	Phenol	1.0	< 1.0 U
111-44-4	Bis-(2-Chloroethyl) Ether	1.0	< 1.0 U
95-57-8	2-Chlorophenol	1.0	< 1.0 U
541-73-1	1,3-Dichlorobenzene	1.0	< 1.0 U
106-46-7	1,4-Dichlorobenzene	1.0	< 1.0 U
100-51-6	Benzyl Alcohol	5.0	< 5.0 U
95-50-1	1,2-Dichlorobenzene	1.0	< 1.0 U
95-48-7	2-Methylphenol	1.0	< 1.0 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	1.0	< 1.0 U
106-44-5	4-Methylphenol	1.0	< 1.0 U
621-64-7	N-Nitroso-Di-N-Propylamine	5.0	< 5.0 U
67-72-1	Hexachloroethane	1.0	< 1.0 U
98-95-3	Nitrobenzene	1.0	< 1.0 U
78-59-1	Isophorone	1.0	< 1.0 U
88-75-5	2-Nitrophenol	5.0	< 5.0 U
105-67-9	2,4-Dimethylphenol	1.0	< 1.0 U
65-85-0	Benzoic Acid	10	< 10 U
111-91-1	bis(2-Chloroethoxy) Methane	1.0	< 1.0 U
120-83-2	2,4-Dichlorophenol	5.0	< 5.0 U
120-82-1	1,2,4-Trichlorobenzene	1.0	< 1.0 U
91-20-3	Naphthalene	1.0	< 1.0 U
106-47-8	4-Chloroaniline	5.0	< 5.0 U
87-68-3	Hexachlorobutadiene	1.0	< 1.0 U
59-50-7	4-Chloro-3-methylphenol	5.0	< 5.0 U
91-57-6	2-Methylnaphthalene	1.0	< 1.0 U
77-47-4	Hexachlorocyclopentadiene	5.0	< 5.0 U
88-06-2	2,4,6-Trichlorophenol	5.0	< 5.0 U
95-95-4	2,4,5-Trichlorophenol	5.0	< 5.0 U
91-58-7	2-Chloronaphthalene	1.0	< 1.0 U
88-74-4	2-Nitroaniline	5.0	< 5.0 U
131-11-3	Dimethylphthalate	1.0	< 1.0 U
208-96-8	Acenaphthylene	1.0	< 1.0 U
99-09-2	3-Nitroaniline	5.0	< 5.0 U
83-32-9	Acenaphthene	1.0	< 1.0 U
51-28-5	2,4-Dinitrophenol	10	< 10 U
100-02-7	4-Nitrophenol	5.0	< 5.0 U
132-64-9	Dibenzofuran	1.0	< 1.0 U
606-20-2	2,6-Dinitrotoluene	5.0	< 5.0 U
121-14-2	2,4-Dinitrotoluene	5.0	< 5.0 U
84-66-2	Diethylphthalate	1.0	< 1.0 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by SW8270D GC/MS

Sample ID: LDW-SS527-RB
SAMPLE

Lab Sample ID: QC19H
LIMS ID: 09-31855
Matrix: Water
Date Analyzed: 12/29/09 16:27

QC Report No: QC19-Windward Environmental, LLC
Project: LDW DIOXIN SAMPLING
04-08-06-29

CAS Number	Analyte	RL	Result
7005-72-3	4-Chlorophenyl-phenylether	1.0	< 1.0 U
86-73-7	Fluorene	1.0	< 1.0 U
100-01-6	4-Nitroaniline	5.0	< 5.0 U
534-52-1	4,6-Dinitro-2-Methylphenol	10	< 10 U
86-30-6	N-Nitrosodiphenylamine	1.0	< 1.0 U
101-55-3	4-Bromophenyl-phenylether	1.0	< 1.0 U
118-74-1	Hexachlorobenzene	1.0	< 1.0 U
87-86-5	Pentachlorophenol	5.0	< 5.0 U
85-01-8	Phenanthrene	1.0	< 1.0 U
86-74-8	Carbazole	1.0	< 1.0 U
120-12-7	Anthracene	1.0	< 1.0 U
84-74-2	Di-n-Butylphthalate	1.0	< 1.0 U
206-44-0	Fluoranthene	1.0	< 1.0 U
129-00-0	Pyrene	1.0	< 1.0 U
85-68-7	Butylbenzylphthalate	1.0	< 1.0 U
91-94-1	3,3'-Dichlorobenzidine	5.0	< 5.0 U
56-55-3	Benzo(a)anthracene	1.0	< 1.0 U
117-81-7	bis(2-Ethylhexyl)phthalate	1.0	< 1.0 U
218-01-9	Chrysene	1.0	< 1.0 U
117-84-0	Di-n-Octyl phthalate	1.0	< 1.0 U
205-99-2	Benzo(b)fluoranthene	1.0	< 1.0 U
207-08-9	Benzo(k)fluoranthene	1.0	< 1.0 U
50-32-8	Benzo(a)pyrene	1.0	< 1.0 U
193-39-5	Indeno(1,2,3-cd)pyrene	1.0	< 1.0 U
53-70-3	Dibenz(a,h)anthracene	1.0	< 1.0 U
191-24-2	Benzo(g,h,i)perylene	1.0	< 1.0 U
62-53-3	Aniline	1.0	< 1.0 U
62-75-9	N-Nitrosodimethylamine	5.0	< 5.0 U
90-12-0	1-Methylnaphthalene	1.0	< 1.0 U

Reported in µg/L (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	79.6%	2-Fluorobiphenyl	88.8%
d14-p-Terphenyl	122%	d4-1,2-Dichlorobenzene	77.2%
d5-Phenol	34.9%	2-Fluorophenol	45.6%
2,4,6-Tribromophenol	69.1%	d4-2-Chlorophenol	65.6%

SVOCS (SIM)

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by Selected Ion Monitoring GC/MS **Sample ID: LDW-SS502-010-comp**
 SAMPLE

Lab Sample ID: QG62A
LIMS ID: 10-1447
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 17:08
Instrument/Analyst: NT2/PK
GPC Cleanup: Yes
Silica Gel Cleanup: No
Alumina Cleanup: No

Sample Amount: 16.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 30.2%

CAS Number	Analyte	RL	Result
106-46-7	1,4-Dichlorobenzene	6.1	< 6.1 U
120-82-1	1,2,4-Trichlorobenzene	6.1	< 6.1 U
118-74-1	Hexachlorobenzene	6.1	< 6.1 U
87-68-3	Hexachlorobutadiene	6.1	< 6.1 U
131-11-3	Dimethylphthalate	15	< 15 U
84-66-2	Diethylphthalate	15	< 15 U
85-68-7	Butylbenzylphthalate	15	< 15 U
95-48-7	2-Methylphenol	6.1	< 6.1 U
105-67-9	2,4-Dimethylphenol	6.1	< 6.1 U
86-30-6	N-Nitrosodiphenylamine	6.1	< 6.1 U
100-51-6	Benzyl Alcohol	30	< 30 U
87-86-5	Pentachlorophenol	30	< 30 U
95-50-1	1,2-Dichlorobenzene	6.1	< 6.1 U
621-64-7	N-Nitroso-Di-N-Propylamine	30	< 30 U
62-75-9	N-Nitrosodimethylamine	30	< 30 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

2-Fluorobiphenyl	75.2%	d5-Phenol	61.9%
2-Fluorophenol	42.1%	d4-2-Chlorophenol	54.4%
d4-1,2-Dichlorobenzene	63.6%	d5-Nitrobenzene	60.8%
2,4,6-Tribromophenol	86.7%	d14-p-Terphenyl	76.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by Selected Ion Monitoring GC/MS **Sample ID: LDW-SS527-010**
 SAMPLE

Lab Sample ID: QG62B
LIMS ID: 10-1448
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/17/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 18:49
Instrument/Analyst: NT2/PK
GPC Cleanup: Yes
Silica Gel Cleanup: No
Alumina Cleanup: No

Sample Amount: 16.2 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 52.8%

CAS Number	Analyte	RL	Result
106-46-7	1,4-Dichlorobenzene	6.2	< 6.2 U
120-82-1	1,2,4-Trichlorobenzene	6.2	< 6.2 U
118-74-1	Hexachlorobenzene	6.2	< 6.2 U
87-68-3	Hexachlorobutadiene	6.2	< 6.2 U
131-11-3	Dimethylphthalate	15	< 15 U
84-66-2	Diethylphthalate	15	< 15 U
85-68-7	**Butylbenzylphthalate**	**15**	**22**
95-48-7	2-Methylphenol	6.2	< 6.2 U
105-67-9	2,4-Dimethylphenol	6.2	< 6.2 U
86-30-6	N-Nitrosodiphenylamine	6.2	< 6.2 U
100-51-6	Benzyl Alcohol	31	< 31 U
87-86-5	Pentachlorophenol	31	< 31 U
95-50-1	1,2-Dichlorobenzene	6.2	< 6.2 U
621-64-7	N-Nitroso-Di-N-Propylamine	31	< 31 U
62-75-9	N-Nitrosodimethylamine	31	< 31 U

Reported in µg/kg (ppb)

SIM Semivolatile Surrogate Recovery

2-Fluorobiphenyl	74.4%	d5-Phenol	58.1%
2-Fluorophenol	48.5%	d4-2-Chlorophenol	52.0%
d4-1,2-Dichlorobenzene	59.2%	d5-Nitrobenzene	58.8%
2,4,6-Tribromophenol	80.0%	d14-p-Terphenyl	73.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by Selected Ion Monitoring GC/MS **Sample ID: LDW-SS603-010**
Page 1 of 1 **SAMPLE**

Lab Sample ID: QG62C
LIMS ID: 10-1449
Matrix: Sediment
Data Release Authorized:
Reported: 02/02/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 12/17/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 19:22
Instrument/Analyst: NT2/PK
GPC Cleanup: Yes
Silica Gel Cleanup: No
Alumina Cleanup: No

Sample Amount: 16.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 54.9%

CAS Number	Analyte	RL	Result
106-46-7	1,4-Dichlorobenzene	6.1	< 6.1 U
120-82-1	1,2,4-Trichlorobenzene	6.1	< 6.1 U
118-74-1	Hexachlorobenzene	6.1	< 6.1 U
87-68-3	Hexachlorobutadiene	6.1	< 6.1 U
131-11-3	Dimethylphthalate	15	< 15 U
84-66-2	Diethylphthalate	15	< 15 U
85-68-7	**Butylbenzylphthalate**	**15**	**22**
95-48-7	2-Methylphenol	6.1	< 6.1 U
105-67-9	2,4-Dimethylphenol	6.1	< 6.1 U
86-30-6	N-Nitrosodiphenylamine	6.1	< 6.1 U
100-51-6	Benzyl Alcohol	30	< 30 U
87-86-5	Pentachlorophenol	30	< 30 U
95-50-1	1,2-Dichlorobenzene	6.1	< 6.1 U
621-64-7	N-Nitroso-Di-N-Propylamine	30	< 30 U
62-75-9	N-Nitrosodimethylamine	30	< 30 U

Reported in μg/kg (ppb)

SIM Semivolatile Surrogate Recovery

2-Fluorobiphenyl	74.8%	d5-Phenol	58.1%
2-Fluorophenol	50.4%	d4-2-Chlorophenol	51.7%
d4-1,2-Dichlorobenzene	60.4%	d5-Nitrobenzene	56.4%
2,4,6-Tribromophenol	82.1%	d14-p-Terphenyl	74.0%

DIOXINS AND FURANS

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS501-010
Sample Collection:
16-Dec-2009 11:39

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-5 R
Matrix:	SOLID	**Sample Size:**	9.73 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 16:34:28	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 25**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	52.7

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.398	0.0514	0.70	1.001
1,2,3,7,8-PECDD [3]	J	1.55	0.0514	0.62	1.002
1,2,3,4,7,8-HXCDD	J	2.68	0.0514	1.14	1.000
1,2,3,6,7,8-HXCDD		10.1	0.0514	1.19	1.001
1,2,3,7,8,9-HXCDD		7.63	0.0514	1.16	1.000
1,2,3,4,6,7,8-HPCDD		248	0.0737	1.00	1.000
OCDD	B	2360	0.0514	0.86	1.000
2,3,7,8-TCDF		3.96	0.0514	0.76	1.002
1,2,3,7,8-PECDF	J	0.717	0.0514	1.56	1.001
2,3,4,7,8-PECDF	J	1.59	0.0514	1.46	1.001
1,2,3,4,7,8-HXCDF	J	5.02	0.0514	1.19	1.000
1,2,3,6,7,8-HXCDF	J	1.73	0.0514	1.20	1.001
1,2,3,7,8,9-HXCDF	J	0.167	0.0514	1.10	1.000
2,3,4,6,7,8-HXCDF	J	1.43	0.0514	1.10	1.001
1,2,3,4,6,7,8-HPCDF		40.5	0.0514	1.01	1.000
1,2,3,4,7,8,9-HPCDF	J	2.79	0.0514	0.95	1.000
OCDF		165	0.0514	0.86	1.002
TOTAL TETRA-DIOXINS		6.25	0.0514		
TOTAL PENTA-DIOXINS		12.4	0.0514		
TOTAL HEXA-DIOXINS		99.4	0.0514		
TOTAL HEPTA-DIOXINS		738	0.0737		
TOTAL TETRA-FURANS		22.3	0.0514		
TOTAL PENTA-FURANS		26.7	0.0514		
TOTAL HEXA-FURANS		62.6	0.0514		
TOTAL HEPTA-FURANS		145	0.0514		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:21:33; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB5_L14065-5_Form1A_DX0M_015S25_SJ1108232.html; Workgroup: WG31628; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS501-010
Sample Collection:
16-Dec-2009 11:39

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-5 R
Matrix:	SOLID	**Sample Size:**	9.73 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 00:27:31	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	52.7

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.27	0.195	0.73	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-5_Form1A_DB0B_033S8_SJ1107311.html; Workgroup: WG31628; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS502-010-COMP
Sample Collection:
11-Jan-2010 17:04

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-1
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 15:43:20	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	72.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.122	0.0489	0.49	1.000
1,2,3,7,8-PECDD [3]	K J	0.491	0.0489	0.48	1.001
1,2,3,4,7,8-HXCDD	J	0.704	0.0489	1.40	1.000
1,2,3,6,7,8-HXCDD		2.14	0.0489	1.26	1.000
1,2,3,7,8,9-HXCDD		1.80	0.0489	1.13	1.000
1,2,3,4,6,7,8-HPCDD		42.5	0.0512	0.99	1.000
OCDD	B	393	0.0519	0.86	1.000
2,3,7,8-TCDF		1.45	0.0489	0.75	1.001
1,2,3,7,8-PECDF	J	0.383	0.0489	1.57	1.001
2,3,4,7,8-PECDF	J	0.667	0.0489	1.53	1.001
1,2,3,4,7,8-HXCDF		1.34	0.0489	1.35	1.001
1,2,3,6,7,8-HXCDF	J	0.736	0.0489	1.20	1.000
1,2,3,7,8,9-HXCDF	K J	0.066	0.0489	0.82	1.001
2,3,4,6,7,8-HXCDF	J	0.690	0.0489	1.06	1.001
1,2,3,4,6,7,8-HPCDF		19.4	0.0489	0.99	1.000
1,2,3,4,7,8,9-HPCDF	J	0.752	0.0489	1.05	1.001
OCDF	B	40.9	0.0489	0.85	1.002
TOTAL TETRA-DIOXINS		4.40	0.0489		
TOTAL PENTA-DIOXINS		5.38	0.0489		
TOTAL HEXA-DIOXINS		21.4	0.0489		
TOTAL HEPTA-DIOXINS		110	0.0512		
TOTAL TETRA-FURANS		10.2	0.0489		
TOTAL PENTA-FURANS		10.8	0.0489		
TOTAL HEXA-FURANS		20.1	0.0489		
TOTAL HEPTA-FURANS		48.1	0.0489		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14159-1_Form1A_DX0M_019S7_SJ1112381.html; Workgroup: WG31619; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS502-010-COMP
Sample Collection:
11-Jan-2010 17:04

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-1
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 12:49:47	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	72.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	K J	0.900	0.0645	0.91	1.001

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 23-Feb-2010 14:53:00; Application: XMLTransformer-1.10.17;
Report Filename: 1613_DIOXINS_1613DB225_L14159-1_Form1A_DB0B_039S6_SJ1111274.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS503-043-COMP
Sample Collection:
11-Jan-2010 18:28

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-2
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 16:38:22	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	77.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K	0.279	0.0495	0.46	1.001
1,2,3,7,8-PECDD [3]	J	0.518	0.0479	0.61	1.001
1,2,3,4,7,8-HXCDD	J	0.630	0.0479	1.26	1.000
1,2,3,6,7,8-HXCDD		2.31	0.0479	1.21	1.000
1,2,3,7,8,9-HXCDD		1.82	0.0479	1.29	1.000
1,2,3,4,6,7,8-HPCDD		42.0	0.0721	1.01	1.000
OCDD	B	410	0.0942	0.85	1.000
2,3,7,8-TCDF		2.67	0.0479	0.74	1.002
1,2,3,7,8-PECDF	J	0.447	0.0479	1.45	1.002
2,3,4,7,8-PECDF		0.977	0.0479	1.46	1.001
1,2,3,4,7,8-HXCDF		2.47	0.0479	1.22	1.000
1,2,3,6,7,8-HXCDF		1.08	0.0479	1.11	1.001
1,2,3,7,8,9-HXCDF	U		0.0479		
2,3,4,6,7,8-HXCDF	J	0.964	0.0479	1.30	1.000
1,2,3,4,6,7,8-HPCDF		15.2	0.0479	1.03	1.000
1,2,3,4,7,8,9-HPCDF		1.06	0.0479	1.11	1.000
OCDF	B	53.2	0.0479	0.88	1.002
TOTAL TETRA-DIOXINS		7.17	0.0495		
TOTAL PENTA-DIOXINS		7.90	0.0479		
TOTAL HEXA-DIOXINS		20.2	0.0479		
TOTAL HEPTA-DIOXINS		85.6	0.0721		
TOTAL TETRA-FURANS		21.6	0.0479		
TOTAL PENTA-FURANS		26.5	0.0479		
TOTAL HEXA-FURANS		29.9	0.0479		
TOTAL HEPTA-FURANS		49.5	0.0479		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14159-2_Form1A_DX0M_019S8_SJ1112382.html; Workgroup: WG31619; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS503-043-COMP
Sample Collection:
11-Jan-2010 18:28

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-2
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 13:25:40	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	77.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.11	0.192	0.74	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14159-2_Form1A_DB0B_039S7_SJ1111275.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS504-010
Sample Collection:
16-Dec-2009 12:50

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-6 R
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 01:52:52	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.150	0.0489	0.55	1.001
1,2,3,7,8-PECDD [3]	K J	0.277	0.0489	0.75	1.001
1,2,3,4,7,8-HXCDD	J	0.479	0.0489	1.18	1.000
1,2,3,6,7,8-HXCDD	J	2.27	0.0489	1.17	1.000
1,2,3,7,8,9-HXCDD	J	1.57	0.0489	1.15	1.000
1,2,3,4,6,7,8-HPCDD	B	50.9	0.113	0.99	1.000
OCDD	B	497	0.0489	0.87	1.000
2,3,7,8-TCDF	J	0.928	0.0489	0.81	1.002
1,2,3,7,8-PECDF	J	0.205	0.0489	1.70	1.001
2,3,4,7,8-PECDF	J	0.467	0.0489	1.37	1.001
1,2,3,4,7,8-HXCDF	J	2.43	0.0489	1.30	1.000
1,2,3,6,7,8-HXCDF	J	0.561	0.0489	1.25	1.000
1,2,3,7,8,9-HXCDF	K J	0.067	0.0489	0.96	1.000
2,3,4,6,7,8-HXCDF	J	0.378	0.0489	1.42	1.000
1,2,3,4,6,7,8-HPCDF		14.0	0.0546	1.05	1.000
1,2,3,4,7,8,9-HPCDF	J	1.33	0.0546	0.92	1.000
OCDF		63.6	0.0565	0.85	1.002
TOTAL TETRA-DIOXINS		1.68	0.0489		
TOTAL PENTA-DIOXINS		2.23	0.0489		
TOTAL HEXA-DIOXINS		18.9	0.0489		
TOTAL HEPTA-DIOXINS	B	136	0.113		
TOTAL TETRA-FURANS		5.63	0.0489		
TOTAL PENTA-FURANS		7.09	0.0489		
TOTAL HEXA-FURANS		22.3	0.0489		
TOTAL HEPTA-FURANS		56.4	0.0546		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 09:23:13; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-6_Form1A_DX0M_012S7_SJ1105765.html; Workgroup: WG31593; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS504-010
Sample Collection:
16-Dec-2009 12:50

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-6 R
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 13:22:42	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.437	0.0775	0.76	1.000

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 13:54:11; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-6_Form1A_DB0B_031AS6_SJ1106674.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS505-010
Sample Collection:
16-Dec-2009 08:13

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-7 R (A)
Matrix:	SOLID	**Sample Size:**	10.3 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 22:25:12	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 31**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 28
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.511	0.0487	0.70	1.001
1,2,3,7,8-PECDD [3]	J	2.12	0.0487	0.60	1.001
1,2,3,4,7,8-HXCDD	J	3.79	0.0487	1.27	1.000
1,2,3,6,7,8-HXCDD		15.3	0.0487	1.18	1.000
1,2,3,7,8,9-HXCDD		11.1	0.0487	1.19	1.000
1,2,3,4,6,7,8-HPCDD		402	0.0875	1.02	1.000
OCDD	B	3900	0.0487	0.88	1.000
2,3,7,8-TCDF		6.23	0.0487	0.74	1.003
1,2,3,7,8-PECDF	J	1.17	0.0487	1.48	1.001
2,3,4,7,8-PECDF	J	2.65	0.0487	1.55	1.001
1,2,3,4,7,8-HXCDF		8.61	0.0487	1.21	1.000
1,2,3,6,7,8-HXCDF	J	2.91	0.0487	1.15	1.000
1,2,3,7,8,9-HXCDF	J	0.223	0.0487	1.16	1.001
2,3,4,6,7,8-HXCDF	J	2.36	0.0487	1.18	1.000
1,2,3,4,6,7,8-HPCDF		74.4	0.0546	1.03	1.000
1,2,3,4,7,8,9-HPCDF		5.37	0.0546	1.03	1.000
OCDF		330	0.0487	0.86	1.002
TOTAL TETRA-DIOXINS		8.10	0.0487		
TOTAL PENTA-DIOXINS		14.5	0.0487		
TOTAL HEXA-DIOXINS		141	0.0487		
TOTAL HEPTA-DIOXINS		1130	0.0875		
TOTAL TETRA-FURANS		33.5	0.0487		
TOTAL PENTA-FURANS		46.1	0.0487		
TOTAL HEXA-FURANS		111	0.0487		
TOTAL HEPTA-FURANS		282	0.0546		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:21:33; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB5_L14065-7_Form1A_DX0M_015S31_SJ1108578.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS505-010
Sample Collection:
16-Dec-2009 08:13

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-7 R (A)
Matrix:	SOLID	**Sample Size:**	10.3 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 01:03:18	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 9**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		2.26	0.226	0.84	1.000

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:22:20; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB225_L14065-7_Form1A_DB0B_033S9_SJ1107312.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS505-010 (Duplicate)
Sample Collection:
16-Dec-2009 08:13

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	WG31628-103 (DUP L14065-7)
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 23:20:10	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 32**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 28
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.0

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.558	0.0495	0.68	1.002
1,2,3,7,8-PECDD [3]	J	2.19	0.0495	0.60	1.001
1,2,3,4,7,8-HXCDD	J	3.98	0.0495	1.27	1.000
1,2,3,6,7,8-HXCDD		14.9	0.0495	1.25	1.001
1,2,3,7,8,9-HXCDD		11.2	0.0495	1.19	1.000
1,2,3,4,6,7,8-HPCDD		382	0.0967	1.02	1.000
OCDD	B	3770	0.0495	0.87	1.000
2,3,7,8-TCDF		6.29	0.0495	0.74	1.002
1,2,3,7,8-PECDF	J	1.16	0.0495	1.57	1.001
2,3,4,7,8-PECDF	J	2.52	0.0495	1.48	1.001
1,2,3,4,7,8-HXCDF		8.80	0.0495	1.20	1.000
1,2,3,6,7,8-HXCDF	J	2.86	0.0495	1.27	1.001
1,2,3,7,8,9-HXCDF	J	0.238	0.0495	1.26	1.000
2,3,4,6,7,8-HXCDF	J	2.31	0.0495	1.17	1.001
1,2,3,4,6,7,8-HPCDF		72.7	0.0543	1.01	1.000
1,2,3,4,7,8,9-HPCDF		5.20	0.0543	1.02	1.000
OCDF		316	0.0495	0.85	1.002
TOTAL TETRA-DIOXINS		8.76	0.0495		
TOTAL PENTA-DIOXINS		15.8	0.0495		
TOTAL HEXA-DIOXINS		141	0.0495		
TOTAL HEPTA-DIOXINS		1090	0.0967		
TOTAL TETRA-FURANS		33.8	0.0495		
TOTAL PENTA-FURANS		43.3	0.0495		
TOTAL HEXA-FURANS		111	0.0495		
TOTAL HEPTA-FURANS		275	0.0543		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_WG31628-103_Form1A_DX0M_015S32_SJ1108579.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

Form 1A

PCDD/PCDF ANALYSIS REPORT

CLIENT SAMPLE NO.
LDW-SS505-010 (Duplicate)
Sample Collection:
16-Dec-2009 08:13

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	WG31628-103 (DUP L14065-7)
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 01:39:06	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.0

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		2.30	0.152	0.84	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_WG31628-103_Form1A_DB0B_033S10_SJ1107313.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

PCDD/PCDF ANALYSIS REPORT
RELATIVE PERCENT DIFFERENCE

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

Project No. LDW DIOXIN AND FURAN SAMPLING

Contract No.: 4033

Client ID: LDW-SS505-010

Concentration Units: ng/kg (dry weight basis)

COMPOUND	L14065-7 (A) LAB FLAG [1]	L14065-7 (A) CONC. FOUND	WG31628-103 LAB FLAG [1]	WG31628-103 CONC. FOUND	MEAN	RELATIVE PERCENT DIFFERENCE
2,3,7,8-TCDD	J	0.511	J	0.558	0.534	8.79
1,2,3,7,8-PECDD	J	2.12	J	2.19	2.16	3.29
1,2,3,4,7,8-HXCDD	J	3.79	J	3.98	3.89	5.06
1,2,3,6,7,8-HXCDD		15.3		14.9	15.1	2.55
1,2,3,7,8,9-HXCDD		11.1		11.2	11.1	0.768
1,2,3,4,6,7,8-HPCDD		402		382	392	5.15
OCDD		3900		3770	3830	3.31
2,3,7,8-TCDF		2.26		2.30	2.28	1.76
1,2,3,7,8-PECDF	J	1.17	J	1.16	1.17	0.250
2,3,4,7,8-PECDF	J	2.65	J	2.52	2.59	5.05
1,2,3,4,7,8-HXCDF		8.61		8.80	8.70	2.12
1,2,3,6,7,8-HXCDF	J	2.91	J	2.86	2.89	1.77
1,2,3,7,8,9-HXCDF	J	0.223	J	0.238	0.230	6.64
2,3,4,6,7,8-HXCDF	J	2.36	J	2.31	2.33	2.17
1,2,3,4,6,7,8-HPCDF		74.4		72.7	73.6	2.38
1,2,3,4,7,8,9-HPCDF		5.37		5.20	5.29	3.19
OCDF		330		316	323	4.28

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: RPD_DIOXINS_1613-RPD_WG31628-103_L14065-7_.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS506-010
Sample Collection:
16-Dec-2009 13:12

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-8 R
Matrix:	SOLID	**Sample Size:**	9.77 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 02:47:51	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.608	0.0512	0.71	1.001
1,2,3,7,8-PECDD [3]	J	2.14	0.0512	0.62	1.001
1,2,3,4,7,8-HXCDD	J	4.17	0.0512	1.25	1.000
1,2,3,6,7,8-HXCDD		14.8	0.0512	1.21	1.000
1,2,3,7,8,9-HXCDD		10.8	0.0512	1.30	1.000
1,2,3,4,6,7,8-HPCDD	B	358	0.0907	1.01	1.000
OCDD	B	3440	0.0512	0.86	1.000
2,3,7,8-TCDF		6.62	0.0512	0.75	1.002
1,2,3,7,8-PECDF	J	1.16	0.0512	1.47	1.001
2,3,4,7,8-PECDF	J	2.62	0.0512	1.49	1.001
1,2,3,4,7,8-HXCDF		10.4	0.0512	1.20	1.001
1,2,3,6,7,8-HXCDF	J	3.06	0.0512	1.20	1.000
1,2,3,7,8,9-HXCDF	J	0.200	0.0512	1.10	1.000
2,3,4,6,7,8-HXCDF	J	2.43	0.0512	1.21	1.000
1,2,3,4,6,7,8-HPCDF		78.2	0.0710	1.04	1.000
1,2,3,4,7,8,9-HPCDF		5.98	0.0710	0.98	1.000
OCDF		320	0.0523	0.86	1.002
TOTAL TETRA-DIOXINS		7.58	0.0512		
TOTAL PENTA-DIOXINS		14.8	0.0512		
TOTAL HEXA-DIOXINS		125	0.0512		
TOTAL HEPTA-DIOXINS	B	945	0.0907		
TOTAL TETRA-FURANS		38.4	0.0512		
TOTAL PENTA-FURANS		47.6	0.0512		
TOTAL HEXA-FURANS		117	0.0512		
TOTAL HEPTA-FURANS		282	0.0710		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-8_Form1A_DX0M_012S8_SJ1105766.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS506-010
Sample Collection:
16-Dec-2009 13:12

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-8 R
Matrix:	SOLID	**Sample Size:**	9.77 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 17:32:47	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 13**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		2.06	0.239	0.77	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-8_Form1A_DB0B_031AS13_SJ1106681.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS507-010
Sample Collection:
16-Dec-2009 13:34

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-9 R
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 12:50:41	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 21**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	50.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.453	0.0493	0.66	1.001
1,2,3,7,8-PECDD [3]	J	1.44	0.0493	0.63	1.001
1,2,3,4,7,8-HXCDD	J	2.51	0.0493	1.20	1.000
1,2,3,6,7,8-HXCDD		10.9	0.0493	1.22	1.001
1,2,3,7,8,9-HXCDD		7.39	0.0493	1.19	1.000
1,2,3,4,6,7,8-HPCDD		315	0.144	1.02	1.000
OCDD	B	4080	0.717	0.87	1.000
2,3,7,8-TCDF		4.38	0.0493	0.73	1.002
1,2,3,7,8-PECDF	J	0.944	0.0493	1.46	1.001
2,3,4,7,8-PECDF	J	1.96	0.0493	1.51	1.000
1,2,3,4,7,8-HXCDF		8.00	0.0493	1.18	1.001
1,2,3,6,7,8-HXCDF	J	2.20	0.0493	1.23	1.001
1,2,3,7,8,9-HXCDF	J	0.197	0.0493	1.34	1.000
2,3,4,6,7,8-HXCDF	J	1.63	0.0493	1.22	1.000
1,2,3,4,6,7,8-HPCDF		58.4	0.0502	1.02	1.000
1,2,3,4,7,8,9-HPCDF	J	4.56	0.0502	0.98	1.000
OCDF		285	0.0499	0.87	1.002
TOTAL TETRA-DIOXINS		5.93	0.0493		
TOTAL PENTA-DIOXINS		11.2	0.0493		
TOTAL HEXA-DIOXINS		104	0.0493		
TOTAL HEPTA-DIOXINS		1080	0.144		
TOTAL TETRA-FURANS		23.9	0.0493		
TOTAL PENTA-FURANS		32.5	0.0493		
TOTAL HEXA-FURANS		95.6	0.0493		
TOTAL HEPTA-FURANS		242	0.0502		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-9_Form1A_DX0M_015S21_SJ1108228.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

Form 1A

PCDD/PCDF ANALYSIS REPORT

CLIENT SAMPLE NO.
LDW-SS507-010
Sample Collection:
16-Dec-2009 13:34

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-9 R
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 02:14:54	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 11**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	50.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.55	0.147	0.87	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-9_Form1A_DB0B_033S11_SJ1107314.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS508-010
Sample Collection:
15-Dec-2009 19:45

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-1 R
Matrix:	SOLID	**Sample Size:**	10.6 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 00:57:51	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	44.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.058	0.0474	0.44	1.001
1,2,3,7,8-PECDD [3]	U		0.0474		
1,2,3,4,7,8-HXCDD	K J	0.061	0.0474	1.96	1.001
1,2,3,6,7,8-HXCDD	J	0.081	0.0474	1.25	1.000
1,2,3,7,8,9-HXCDD	J	0.198	0.0474	1.42	1.001
1,2,3,4,6,7,8-HPCDD	B J	1.48	0.0474	0.98	1.000
OCDD	B	11.3	0.0474	0.88	1.000
2,3,7,8-TCDF	U		0.0474		
1,2,3,7,8-PECDF	U		0.0474		
2,3,4,7,8-PECDF	U		0.0474		
1,2,3,4,7,8-HXCDF	U		0.0474		
1,2,3,6,7,8-HXCDF	U		0.0474		
1,2,3,7,8,9-HXCDF	U		0.0474		
2,3,4,6,7,8-HXCDF	U		0.0474		
1,2,3,4,6,7,8-HPCDF	J	0.203	0.0474	1.05	1.000
1,2,3,4,7,8,9-HPCDF	U		0.0474		
OCDF	J	0.673	0.0474	0.90	1.002
TOTAL TETRA-DIOXINS		0.207	0.0474		
TOTAL PENTA-DIOXINS		0.099	0.0474		
TOTAL HEXA-DIOXINS		1.44	0.0474		
TOTAL HEPTA-DIOXINS	B	3.59	0.0474		
TOTAL TETRA-FURANS		0.296	0.0474		
TOTAL PENTA-FURANS		0.070	0.0474		
TOTAL HEXA-FURANS		0.217	0.0474		
TOTAL HEPTA-FURANS		0.527	0.0474		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 09:23:13; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-1_Form1A_DX0M_012S6_SJ1105764.html; Workgroup: WG31593; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS509-010
Sample Collection:
15-Dec-2009 22:00

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-4 R
Matrix:	SOLID	**Sample Size:**	10.6 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	04-Feb-2010 **Time:** 01:10:04	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 34**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 28
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	45.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B	5.59	0.0471	0.69	1.001
1,2,3,7,8-PECDD [3]		15.3	0.0471	0.60	1.001
1,2,3,4,7,8-HXCDD		13.7	0.0634	1.23	1.000
1,2,3,6,7,8-HXCDD		47.7	0.0634	1.21	1.000
1,2,3,7,8,9-HXCDD		41.8	0.0634	1.21	1.000
1,2,3,4,6,7,8-HPCDD		600	0.121	1.00	1.000
OCDD	B	5090	0.0471	0.87	1.000
2,3,7,8-TCDF		187	0.0588	0.75	1.003
1,2,3,7,8-PECDF		28.8	0.0627	1.51	1.001
2,3,4,7,8-PECDF		54.8	0.0627	1.51	1.001
1,2,3,4,7,8-HXCDF		39.4	0.0627	1.22	1.000
1,2,3,6,7,8-HXCDF		30.2	0.0627	1.22	1.001
1,2,3,7,8,9-HXCDF	J	2.35	0.0627	1.32	1.001
2,3,4,6,7,8-HXCDF		32.9	0.0627	1.19	1.001
1,2,3,4,6,7,8-HPCDF		219	0.0989	1.00	1.000
1,2,3,4,7,8,9-HPCDF		11.5	0.0989	1.00	1.000
OCDF		385	0.0471	0.86	1.002
TOTAL TETRA-DIOXINS		205	0.0471		
TOTAL PENTA-DIOXINS		232	0.0471		
TOTAL HEXA-DIOXINS		511	0.0634		
TOTAL HEPTA-DIOXINS		1910	0.121		
TOTAL TETRA-FURANS		1090	0.0588		
TOTAL PENTA-FURANS		716	0.0627		
TOTAL HEXA-FURANS		566	0.0627		
TOTAL HEPTA-FURANS		594	0.0989		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:21:33; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB5_L14065-4_Form1A_DX0M_015S34_SJ1108581.html; Workgroup: WG31628; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS509-010
Sample Collection:
15-Dec-2009 22:00

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-4 R
Matrix:	SOLID	**Sample Size:**	10.6 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	02-Feb-2010 **Time:** 23:51:43	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	45.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		55.4	3.43	0.80	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:22:20; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB225_L14065-4_Form1A_DB0B_033S7_SJ1107310.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS510-010
Sample Collection:
16-Dec-2009 14:02

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-10 R
Matrix:	SOLID	**Sample Size:**	10.5 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 13:45:44	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 22**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	51.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.324	0.0477	0.67	1.001
1,2,3,7,8-PECDD [3]	J	1.04	0.0477	0.62	1.001
1,2,3,4,7,8-HXCDD	J	1.61	0.0477	1.17	1.000
1,2,3,6,7,8-HXCDD		5.92	0.0477	1.24	1.000
1,2,3,7,8,9-HXCDD	J	4.64	0.0477	1.26	1.000
1,2,3,4,6,7,8-HPCDD		141	0.0550	1.02	1.000
OCDD	B	1380	0.0477	0.87	1.000
2,3,7,8-TCDF		2.78	0.0477	0.75	1.001
1,2,3,7,8-PECDF	J	0.472	0.0477	1.49	1.001
2,3,4,7,8-PECDF	J	0.994	0.0477	1.50	1.001
1,2,3,4,7,8-HXCDF	J	3.56	0.0496	1.20	1.000
1,2,3,6,7,8-HXCDF	J	1.17	0.0496	1.23	1.000
1,2,3,7,8,9-HXCDF	J	0.106	0.0496	1.31	1.000
2,3,4,6,7,8-HXCDF	J	0.901	0.0496	1.35	1.000
1,2,3,4,6,7,8-HPCDF		29.6	0.0477	1.01	1.000
1,2,3,4,7,8,9-HPCDF	J	2.27	0.0477	1.03	1.000
OCDF		149	0.0477	0.85	1.002
TOTAL TETRA-DIOXINS		4.03	0.0477		
TOTAL PENTA-DIOXINS		7.47	0.0477		
TOTAL HEXA-DIOXINS		56.8	0.0477		
TOTAL HEPTA-DIOXINS		410	0.0550		
TOTAL TETRA-FURANS		13.7	0.0477		
TOTAL PENTA-FURANS		17.7	0.0477		
TOTAL HEXA-FURANS		46.0	0.0496		
TOTAL HEPTA-FURANS		122	0.0477		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:21:33; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB5_L14065-10_Form1A_DX0M_015S22_SJ1108229.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS510-010
Sample Collection:
16-Dec-2009 14:02

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-10 R
Matrix:	SOLID	**Sample Size:**	10.5 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 02:50:44	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 12**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	51.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.801	0.112	0.78	1.000

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:22:20; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB225_L14065-10_Form1A_DB0B_033S12_SJ1107315.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS511-010
Sample Collection:
17-Dec-2009 14:21

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-23
Matrix:	SOLID	**Sample Size:**	9.36 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	16-Jan-2010 **Time:** 07:31:05	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 20**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 11
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	43.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.386	0.0534	0.67	1.001
1,2,3,7,8-PECDD [3]	J	1.09	0.0534	0.62	1.000
1,2,3,4,7,8-HXCDD	J	1.92	0.0534	1.25	1.000
1,2,3,6,7,8-HXCDD		7.40	0.0534	1.28	1.000
1,2,3,7,8,9-HXCDD		5.81	0.0534	1.22	1.000
1,2,3,4,6,7,8-HPCDD		192	0.0900	1.03	1.000
OCDD	B	1960	0.0625	0.86	1.000
2,3,7,8-TCDF		3.26	0.0534	0.75	1.002
1,2,3,7,8-PECDF	J	0.550	0.0534	1.62	1.001
2,3,4,7,8-PECDF	J	1.30	0.0534	1.48	1.001
1,2,3,4,7,8-HXCDF	J	4.79	0.0534	1.25	1.000
1,2,3,6,7,8-HXCDF	J	1.48	0.0534	1.16	1.001
1,2,3,7,8,9-HXCDF	K J	0.108	0.0534	0.80	1.000
2,3,4,6,7,8-HXCDF	J	1.24	0.0534	1.19	1.001
1,2,3,4,6,7,8-HPCDF		35.9	0.0572	1.00	1.000
1,2,3,4,7,8,9-HPCDF	J	2.63	0.0572	0.95	1.000
OCDF		168	0.0770	0.86	1.002
TOTAL TETRA-DIOXINS		4.90	0.0534		
TOTAL PENTA-DIOXINS		7.80	0.0534		
TOTAL HEXA-DIOXINS		73.1	0.0534		
TOTAL HEPTA-DIOXINS		594	0.0900		
TOTAL TETRA-FURANS		18.4	0.0534		
TOTAL PENTA-FURANS		21.6	0.0534		
TOTAL HEXA-FURANS		59.7	0.0534		
TOTAL HEPTA-FURANS		133	0.0572		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:13:47; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-23_Form1A_DX0M_007S20_SJ1100164.html; Workgroup: WG31355; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS511-010
Sample Collection:
17-Dec-2009 14:21

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-23
Matrix:	SOLID	**Sample Size:**	9.36 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 00:08:00	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_015 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_015 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	43.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	1.00	0.0956	0.69	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:16:21; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-23_Form1A_DB0B_015S8_SJ1099710.html; Workgroup: WG31355; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS512-010
Sample Collection:
16-Dec-2009 14:17

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-11 R
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 03:42:52	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 9**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	66.0

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.217	0.0496	0.52	1.001
1,2,3,7,8-PECDD [3]	J	0.743	0.0496	0.58	1.001
1,2,3,4,7,8-HXCDD	J	1.25	0.0496	1.17	1.000
1,2,3,6,7,8-HXCDD	J	5.20	0.0496	1.17	1.000
1,2,3,7,8,9-HXCDD	J	4.12	0.0496	1.16	1.000
1,2,3,4,6,7,8-HPCDD	B	145	0.0971	1.00	1.000
OCDD	B	1590	0.0496	0.89	1.000
2,3,7,8-TCDF		2.20	0.0496	0.74	1.002
1,2,3,7,8-PECDF	J	0.424	0.0496	1.37	1.001
2,3,4,7,8-PECDF	J	0.970	0.0496	1.48	1.001
1,2,3,4,7,8-HXCDF	J	4.46	0.0496	1.21	1.000
1,2,3,6,7,8-HXCDF	J	1.19	0.0496	1.18	1.000
1,2,3,7,8,9-HXCDF	J	0.096	0.0496	1.11	1.001
2,3,4,6,7,8-HXCDF	J	0.782	0.0496	1.14	1.000
1,2,3,4,6,7,8-HPCDF		30.8	0.0610	1.03	1.000
1,2,3,4,7,8,9-HPCDF	J	2.43	0.0610	0.96	1.000
OCDF		136	0.0496	0.86	1.002
TOTAL TETRA-DIOXINS		2.77	0.0496		
TOTAL PENTA-DIOXINS		5.91	0.0496		
TOTAL HEXA-DIOXINS		53.0	0.0496		
TOTAL HEPTA-DIOXINS	B	469	0.0971		
TOTAL TETRA-FURANS		12.6	0.0496		
TOTAL PENTA-FURANS		16.1	0.0496		
TOTAL HEXA-FURANS		45.7	0.0496		
TOTAL HEPTA-FURANS		119	0.0610		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 09:23:13; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-11_Form1A_DX0M_012S9_SJ1105767.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS512-010
Sample Collection:
16-Dec-2009 14:17

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-11 R
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 16:21:19	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 11**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	66.0

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.692	0.0902	0.67	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-11_Form1A_DB0B_031AS11_SJ1106679.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS513-010
Sample Collection:
17-Dec-2009 14:10

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-24 L2W
Matrix:	SOLID	**Sample Size:**	9.41 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	25-Jan-2010 **Time:** 20:22:33	**GC Column ID:**	DB5
Extract Volume (uL):	50	**Sample Data Filename:**	**DX0M_010 S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_010 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	47.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.588	0.144	0.53	1.001
1,2,3,7,8-PECDD [3]	J	2.11	0.156	0.70	1.001
1,2,3,4,7,8-HXCDD	J	4.61	0.203	1.12	1.000
1,2,3,6,7,8-HXCDD		22.5	0.203	1.21	1.000
1,2,3,7,8,9-HXCDD	J	13.7	0.203	1.07	1.000
1,2,3,4,6,7,8-HPCDD		690	0.714	1.05	1.000
OCDD	B	6650	0.373	0.87	1.000
2,3,7,8-TCDF		7.50	0.164	0.78	1.002
1,2,3,7,8-PECDF	K J	1.80	0.170	1.26	1.000
2,3,4,7,8-PECDF	J	3.56	0.170	1.58	1.002
1,2,3,4,7,8-HXCDF		19.6	0.206	1.28	1.000
1,2,3,6,7,8-HXCDF	J	7.00	0.206	1.23	1.000
1,2,3,7,8,9-HXCDF	K J	0.500	0.206	0.97	1.001
2,3,4,6,7,8-HXCDF	J	3.24	0.206	1.33	1.001
1,2,3,4,6,7,8-HPCDF		150	0.355	0.98	1.000
1,2,3,4,7,8,9-HPCDF	J	12.8	0.355	0.97	1.000
OCDF		760	0.466	0.85	1.002
TOTAL TETRA-DIOXINS		7.48	0.144		
TOTAL PENTA-DIOXINS	J	13.0	0.156		
TOTAL HEXA-DIOXINS		204	0.203		
TOTAL HEPTA-DIOXINS		2030	0.714		
TOTAL TETRA-FURANS		42.1	0.164		
TOTAL PENTA-FURANS		62.9	0.170		
TOTAL HEXA-FURANS		214	0.206		
TOTAL HEPTA-FURANS		662	0.355		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-24_Form1A_DX0M_010S10_SJ1104550.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS513-010
Sample Collection:
17-Dec-2009 14:10

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-24 L
Matrix:	SOLID	**Sample Size:**	9.41 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	21-Jan-2010 **Time:** 00:17:47	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_021 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_021 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	47.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		2.48	0.184	0.86	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-24_Form1A_DB0B_021S7_SJ1102746.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS514-010
Sample Collection:
16-Dec-2009 14:31

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-12 R
Matrix:	SOLID	**Sample Size:**	11.3 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	04-Feb-2010 **Time:** 00:15:08	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 33**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 28
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	60.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.381	0.0443	0.66	1.001
1,2,3,7,8-PECDD [3]	J	1.43	0.0443	0.57	1.001
1,2,3,4,7,8-HXCDD	J	2.41	0.0443	1.23	1.000
1,2,3,6,7,8-HXCDD		12.9	0.0443	1.23	1.001
1,2,3,7,8,9-HXCDD		7.65	0.0443	1.22	1.000
1,2,3,4,6,7,8-HPCDD		333	0.0969	1.04	1.000
OCDD	B	3450	0.0443	0.87	1.000
2,3,7,8-TCDF		4.06	0.0443	0.76	1.002
1,2,3,7,8-PECDF	J	1.14	0.0443	1.51	1.001
2,3,4,7,8-PECDF	J	3.48	0.0443	1.52	1.001
1,2,3,4,7,8-HXCDF		24.2	0.0443	1.22	1.000
1,2,3,6,7,8-HXCDF		4.58	0.0443	1.19	1.001
1,2,3,7,8,9-HXCDF	J	0.335	0.0443	1.17	1.000
2,3,4,6,7,8-HXCDF	J	2.53	0.0443	1.18	1.001
1,2,3,4,6,7,8-HPCDF		93.2	0.0443	1.00	1.000
1,2,3,4,7,8,9-HPCDF		10.7	0.0443	1.03	1.000
OCDF		312	0.0443	0.86	1.002
TOTAL TETRA-DIOXINS		6.75	0.0443		
TOTAL PENTA-DIOXINS		11.3	0.0443		
TOTAL HEXA-DIOXINS		111	0.0443		
TOTAL HEPTA-DIOXINS		973	0.0969		
TOTAL TETRA-FURANS		26.9	0.0443		
TOTAL PENTA-FURANS		46.6	0.0443		
TOTAL HEXA-FURANS		164	0.0443		
TOTAL HEPTA-FURANS		360	0.0443		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-12_Form1A_DX0M_015S33_SJ1108580.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS514-010
Sample Collection:
16-Dec-2009 14:31

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-12 R
Matrix:	SOLID	**Sample Size:**	11.3 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 03:26:31	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 13**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	60.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.62	0.143	0.77	1.000

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-12_Form1A_DB0B_033S13_SJ1107316.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS515-010
Sample Collection:
16-Dec-2009 10:53

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-13 R
Matrix:	SOLID	**Sample Size:**	9.27 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 18:38:51	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 27**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	51.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.696	0.0539	0.71	1.001
1,2,3,7,8-PECDD [3]	J	2.27	0.0539	0.67	1.001
1,2,3,4,7,8-HXCDD	J	3.70	0.0539	1.26	1.000
1,2,3,6,7,8-HXCDD		13.0	0.0539	1.22	1.000
1,2,3,7,8,9-HXCDD		10.0	0.0539	1.20	1.000
1,2,3,4,6,7,8-HPCDD		289	0.113	1.02	1.000
OCDD	B	2800	0.0539	0.87	1.000
2,3,7,8-TCDF		5.00	0.0539	0.76	1.002
1,2,3,7,8-PECDF	J	1.06	0.0539	1.37	1.001
2,3,4,7,8-PECDF	J	2.22	0.0539	1.46	1.001
1,2,3,4,7,8-HXCDF		7.53	0.0539	1.16	1.001
1,2,3,6,7,8-HXCDF	J	2.69	0.0539	1.21	1.000
1,2,3,7,8,9-HXCDF	J	0.200	0.0539	1.30	1.000
2,3,4,6,7,8-HXCDF	J	2.19	0.0539	1.11	1.000
1,2,3,4,6,7,8-HPCDF		56.2	0.0648	1.03	1.000
1,2,3,4,7,8,9-HPCDF	J	4.20	0.0648	1.01	1.000
OCDF		242	0.0539	0.87	1.002
TOTAL TETRA-DIOXINS		8.08	0.0539		
TOTAL PENTA-DIOXINS		15.8	0.0539		
TOTAL HEXA-DIOXINS		107	0.0539		
TOTAL HEPTA-DIOXINS		814	0.113		
TOTAL TETRA-FURANS		32.4	0.0539		
TOTAL PENTA-FURANS		46.0	0.0539		
TOTAL HEXA-FURANS		95.7	0.0539		
TOTAL HEPTA-FURANS		205	0.0648		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-13_Form1A_DX0M_015S27_SJ1108234.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS515-010
Sample Collection:
16-Dec-2009 10:53

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-13 R
Matrix:	SOLID	**Sample Size:**	9.27 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 04:02:21	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 14**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	51.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.72	0.239	0.79	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-13_Form1A_DB0B_033S14_SJ1107317.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS516-010
Sample Collection:
16-Dec-2009 15:06

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-14 R
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 14:40:47	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 23**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.395	0.0466	0.66	1.001
1,2,3,7,8-PECDD [3]	J	1.09	0.0466	0.64	1.001
1,2,3,4,7,8-HXCDD	J	1.87	0.0466	1.24	1.000
1,2,3,6,7,8-HXCDD		8.76	0.0466	1.18	1.000
1,2,3,7,8,9-HXCDD		5.43	0.0466	1.21	1.000
1,2,3,4,6,7,8-HPCDD		223	0.0536	1.05	1.000
OCDD	B	2380	0.0466	0.87	1.000
2,3,7,8-TCDF		4.20	0.0466	0.74	1.002
1,2,3,7,8-PECDF	J	1.00	0.0466	1.53	1.001
2,3,4,7,8-PECDF	J	3.29	0.0466	1.55	1.000
1,2,3,4,7,8-HXCDF		16.5	0.0466	1.21	1.000
1,2,3,6,7,8-HXCDF	J	3.06	0.0466	1.26	1.000
1,2,3,7,8,9-HXCDF	J	0.231	0.0466	1.26	1.001
2,3,4,6,7,8-HXCDF	J	1.68	0.0466	1.26	1.000
1,2,3,4,6,7,8-HPCDF		56.9	0.0505	1.01	1.000
1,2,3,4,7,8,9-HPCDF		4.82	0.0505	1.00	1.000
OCDF		272	0.0466	0.86	1.002
TOTAL TETRA-DIOXINS		4.61	0.0466		
TOTAL PENTA-DIOXINS		8.31	0.0466		
TOTAL HEXA-DIOXINS		69.7	0.0466		
TOTAL HEPTA-DIOXINS		562	0.0536		
TOTAL TETRA-FURANS		22.0	0.0466		
TOTAL PENTA-FURANS		41.3	0.0466		
TOTAL HEXA-FURANS		117	0.0466		
TOTAL HEPTA-FURANS		239	0.0505		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:21:33; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB5_L14065-14_Form1A_DX0M_015S23_SJ1108230.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS516-010
Sample Collection:
16-Dec-2009 15:06

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-14 R
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 04:38:08	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 15**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.13	0.131	0.73	1.000

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-14_Form1A_DB0B_033S15_SJ1107318.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS517-010
Sample Collection:
16-Dec-2009 15:21

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-15 R
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 17:34:39	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 26**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.488	0.0480	0.66	1.001
1,2,3,7,8-PECDD [3]	J	1.53	0.0480	0.63	1.001
1,2,3,4,7,8-HXCDD	J	2.63	0.0480	1.31	1.000
1,2,3,6,7,8-HXCDD		11.4	0.0480	1.24	1.000
1,2,3,7,8,9-HXCDD		7.85	0.0480	1.21	1.000
1,2,3,4,6,7,8-HPCDD		304	0.107	1.01	1.000
OCDD	B	2970	0.0480	0.88	1.000
2,3,7,8-TCDF		5.35	0.0480	0.76	1.002
1,2,3,7,8-PECDF	J	0.754	0.0480	1.47	1.001
2,3,4,7,8-PECDF	J	2.02	0.0480	1.50	1.001
1,2,3,4,7,8-HXCDF		7.62	0.0480	1.19	1.001
1,2,3,6,7,8-HXCDF	J	2.09	0.0480	1.20	1.000
1,2,3,7,8,9-HXCDF	J	0.158	0.0480	1.09	1.000
2,3,4,6,7,8-HXCDF	J	1.55	0.0480	1.17	1.000
1,2,3,4,6,7,8-HPCDF		62.9	0.0780	1.01	1.000
1,2,3,4,7,8,9-HPCDF		4.96	0.0780	0.96	1.000
OCDF		346	0.0480	0.86	1.002
TOTAL TETRA-DIOXINS		5.67	0.0480		
TOTAL PENTA-DIOXINS		13.0	0.0480		
TOTAL HEXA-DIOXINS		108	0.0480		
TOTAL HEPTA-DIOXINS		865	0.107		
TOTAL TETRA-FURANS		27.4	0.0480		
TOTAL PENTA-FURANS		30.3	0.0480		
TOTAL HEXA-FURANS		90.7	0.0480		
TOTAL HEPTA-FURANS		267	0.0780		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-15_Form1A_DX0M_015S26_SJ1108233.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS517-010
Sample Collection:
16-Dec-2009 15:21

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-15 R
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 05:13:57	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 16**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	56.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.57	0.148	0.81	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 11-Feb-2010 08:22:20; Application: XMLTransformer-1.10.16;
Report Filename: 1613_DIOXINS_1613DB225_L14065-15_Form1A_DB0B_033S16_SJ1107319.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS518-010
Sample Collection:
16-Dec-2009 15:37

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-16 R
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 09:29:43	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 15**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	53.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.226	0.0494	0.60	1.001
1,2,3,7,8-PECDD [3]	J	0.560	0.0494	0.55	1.000
1,2,3,4,7,8-HXCDD	J	0.903	0.0494	1.22	1.000
1,2,3,6,7,8-HXCDD	J	2.52	0.0494	1.22	1.001
1,2,3,7,8,9-HXCDD	J	2.56	0.0494	1.31	1.000
1,2,3,4,6,7,8-HPCDD	B	55.1	0.105	1.03	1.000
OCDD	B	525	0.0494	0.86	1.000
2,3,7,8-TCDF	J	0.910	0.0494	0.77	1.002
1,2,3,7,8-PECDF	J	0.262	0.0494	1.51	1.001
2,3,4,7,8-PECDF	J	0.423	0.0494	1.37	1.001
1,2,3,4,7,8-HXCDF	J	1.26	0.0494	1.27	1.000
1,2,3,6,7,8-HXCDF	J	0.494	0.0494	1.13	1.001
1,2,3,7,8,9-HXCDF	J	0.067	0.0494	1.12	1.001
2,3,4,6,7,8-HXCDF	J	0.387	0.0494	1.24	1.000
1,2,3,4,6,7,8-HPCDF		9.79	0.0494	1.06	1.001
1,2,3,4,7,8,9-HPCDF	J	0.793	0.0494	0.95	1.000
OCDF		36.4	0.0494	0.85	1.002
TOTAL TETRA-DIOXINS		2.13	0.0494		
TOTAL PENTA-DIOXINS		3.94	0.0494		
TOTAL HEXA-DIOXINS		24.3	0.0494		
TOTAL HEPTA-DIOXINS	B	139	0.105		
TOTAL TETRA-FURANS		6.11	0.0494		
TOTAL PENTA-FURANS		6.68	0.0494		
TOTAL HEXA-FURANS		14.8	0.0494		
TOTAL HEPTA-FURANS		30.3	0.0494		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-16_Form1A_DX0M_012S15_SJ1106142.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS518-010
Sample Collection:
16-Dec-2009 15:37

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-16 R
Matrix:	SOLID	**Sample Size:**	10.1 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 12:11:17	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 4**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	53.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.351	0.0883	0.75	1.000

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-16_Form1A_DB0B_031AS4_SJ1106672.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS519-010
Sample Collection:
16-Dec-2009 14:53

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-17 R
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 10:24:45	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 16**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	50.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.354	0.0469	0.80	1.001
1,2,3,7,8-PECDD [3]	J	0.675	0.0469	0.53	1.001
1,2,3,4,7,8-HXCDD	J	1.19	0.0471	1.28	1.000
1,2,3,6,7,8-HXCDD	J	4.02	0.0471	1.28	1.000
1,2,3,7,8,9-HXCDD	J	3.33	0.0471	1.12	1.000
1,2,3,4,6,7,8-HPCDD	B	95.8	0.109	1.02	1.000
OCDD	B	892	0.0469	0.87	1.000
2,3,7,8-TCDF		1.62	0.0469	0.80	1.002
1,2,3,7,8-PECDF	J	0.314	0.0469	1.51	1.001
2,3,4,7,8-PECDF	J	0.696	0.0469	1.32	1.001
1,2,3,4,7,8-HXCDF	J	2.61	0.0469	1.24	1.001
1,2,3,6,7,8-HXCDF	J	0.845	0.0469	1.12	1.000
1,2,3,7,8,9-HXCDF	J	0.121	0.0469	1.22	1.000
2,3,4,6,7,8-HXCDF	J	0.657	0.0469	1.20	1.001
1,2,3,4,6,7,8-HPCDF		17.6	0.0590	1.03	1.000
1,2,3,4,7,8,9-HPCDF	J	1.52	0.0590	0.95	1.000
OCDF		74.8	0.0469	0.86	1.002
TOTAL TETRA-DIOXINS		4.42	0.0469		
TOTAL PENTA-DIOXINS		6.57	0.0469		
TOTAL HEXA-DIOXINS		38.5	0.0471		
TOTAL HEPTA-DIOXINS	B	261	0.109		
TOTAL TETRA-FURANS		10.6	0.0469		
TOTAL PENTA-FURANS		12.1	0.0469		
TOTAL HEXA-FURANS		30.3	0.0469		
TOTAL HEPTA-FURANS		65.8	0.0590		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 09:23:13; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-17_Form1A_DX0M_012S16_SJ1106143.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS519-010
Sample Collection:
16-Dec-2009 14:53

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-17 R
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 15:09:49	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 9**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	50.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.596	0.0890	0.84	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-17_Form1A_DB0B_031AS9_SJ1106677.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS520-010
Sample Collection:
11-Jan-2010 10:03

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-8 (A)
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	12-Feb-2010 **Time:** 02:39:30	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 17**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	62.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD		0.378	0.0468	0.67	1.001
1,2,3,7,8-PECDD [3]		1.42	0.0468	0.63	1.001
1,2,3,4,7,8-HXCDD		2.49	0.0468	1.32	1.000
1,2,3,6,7,8-HXCDD		8.40	0.0468	1.26	1.000
1,2,3,7,8,9-HXCDD		7.80	0.0468	1.20	1.000
1,2,3,4,6,7,8-HPCDD		209	0.110	1.00	1.000
OCDD	B	1970	0.0468	0.86	1.000
2,3,7,8-TCDF		4.31	0.0468	0.77	1.002
1,2,3,7,8-PECDF	K J	0.722	0.0468	1.20	1.000
2,3,4,7,8-PECDF		1.80	0.0468	1.42	1.001
1,2,3,4,7,8-HXCDF		4.79	0.0468	1.21	1.000
1,2,3,6,7,8-HXCDF		2.22	0.0468	1.21	1.001
1,2,3,7,8,9-HXCDF	J	0.146	0.0468	1.35	1.000
2,3,4,6,7,8-HXCDF		2.47	0.0468	1.23	1.000
1,2,3,4,6,7,8-HPCDF		38.9	0.0497	1.03	1.000
1,2,3,4,7,8,9-HPCDF		2.65	0.0497	1.03	1.000
OCDF	B	151	0.0468	0.85	1.002
TOTAL TETRA-DIOXINS		4.57	0.0468		
TOTAL PENTA-DIOXINS		9.88	0.0468		
TOTAL HEXA-DIOXINS		76.6	0.0468		
TOTAL HEPTA-DIOXINS		612	0.110		
TOTAL TETRA-FURANS		23.7	0.0468		
TOTAL PENTA-FURANS		29.3	0.0468		
TOTAL HEXA-FURANS		61.5	0.0468		
TOTAL HEPTA-FURANS		138	0.0497		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 23-Feb-2010 14:52:27; Application: XMLTransformer-1.10.17;
Report Filename: 1613_DIOXINS_1613DB5_L14159-8_Form1A_DX0M_019S17_SJ1112919.html; Workgroup: WG31619; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS520-010
Sample Collection:
11-Jan-2010 10:03

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-8 (A)
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 17:00:49	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 13**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	62.3

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.12	0.144	0.75	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14159-8_Form1A_DB0B_039S13_SJ1111281.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS520-010 (Duplicate)
Sample Collection:
11-Jan-2010 10:03

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	WG31619-103 (DUP L14159-8)
Matrix:	SOLID	**Sample Size:**	10.9 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	12-Feb-2010 **Time:** 03:34:33	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 18**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	63.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD		0.378	0.0459	0.67	1.000
1,2,3,7,8-PECDD [3]		1.41	0.0459	0.55	1.001
1,2,3,4,7,8-HXCDD		2.40	0.0459	1.21	1.001
1,2,3,6,7,8-HXCDD		7.71	0.0459	1.15	1.000
1,2,3,7,8,9-HXCDD		7.12	0.0459	1.17	1.000
1,2,3,4,6,7,8-HPCDD		182	0.0910	1.03	1.000
OCDD	B	1850	0.0459	0.87	1.000
2,3,7,8-TCDF		3.73	0.0459	0.75	1.002
1,2,3,7,8-PECDF	J	0.595	0.0459	1.55	1.001
2,3,4,7,8-PECDF		1.38	0.0459	1.42	1.001
1,2,3,4,7,8-HXCDF		4.29	0.0459	1.13	1.000
1,2,3,6,7,8-HXCDF		1.77	0.0459	1.26	1.001
1,2,3,7,8,9-HXCDF	K J	0.140	0.0459	0.95	1.000
2,3,4,6,7,8-HXCDF		1.29	0.0459	1.28	1.001
1,2,3,4,6,7,8-HPCDF		33.5	0.0639	1.02	1.000
1,2,3,4,7,8,9-HPCDF		2.43	0.0639	1.00	1.000
OCDF	B	132	0.0459	0.85	1.002
TOTAL TETRA-DIOXINS		4.98	0.0459		
TOTAL PENTA-DIOXINS		9.54	0.0459		
TOTAL HEXA-DIOXINS		73.3	0.0459		
TOTAL HEPTA-DIOXINS		541	0.0910		
TOTAL TETRA-FURANS		21.8	0.0459		
TOTAL PENTA-FURANS		26.9	0.0459		
TOTAL HEXA-FURANS		54.1	0.0459		
TOTAL HEPTA-FURANS		117	0.0639		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_WG31619-103_Form1A_DX0M_019S18_SJ1112920.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS521-010
Sample Collection:
16-Dec-2009 15:51

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-18 Ri
Matrix:	SOLID	**Sample Size:**	9.94 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 12:34:15	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_013 S: 5**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_013 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	52.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.304	0.0503	0.72	1.001
1,2,3,7,8-PECDD [3]	J	0.713	0.0503	0.64	1.001
1,2,3,4,7,8-HXCDD	J	1.17	0.0503	1.17	1.000
1,2,3,6,7,8-HXCDD	J	4.24	0.0503	1.20	1.000
1,2,3,7,8,9-HXCDD	J	3.19	0.0503	1.22	1.000
1,2,3,4,6,7,8-HPCDD	B	97.1	0.0781	1.08	1.000
OCDD	B	984	0.0503	0.87	1.000
2,3,7,8-TCDF		1.79	0.0503	0.76	1.003
1,2,3,7,8-PECDF	J	0.327	0.0503	1.73	1.002
2,3,4,7,8-PECDF	J	0.761	0.0503	1.56	1.001
1,2,3,4,7,8-HXCDF	J	2.52	0.0503	1.23	1.000
1,2,3,6,7,8-HXCDF	J	0.872	0.0503	1.27	1.001
1,2,3,7,8,9-HXCDF	J	0.076	0.0503	1.08	1.001
2,3,4,6,7,8-HXCDF	J	0.708	0.0503	1.23	1.001
1,2,3,4,6,7,8-HPCDF		19.3	0.0503	1.00	1.000
1,2,3,4,7,8,9-HPCDF	J	1.56	0.0503	1.03	1.000
OCDF		90.4	0.0503	0.87	1.002
TOTAL TETRA-DIOXINS		3.78	0.0503		
TOTAL PENTA-DIOXINS		4.67	0.0503		
TOTAL HEXA-DIOXINS		36.3	0.0503		
TOTAL HEPTA-DIOXINS	B	270	0.0781		
TOTAL TETRA-FURANS		11.5	0.0503		
TOTAL PENTA-FURANS		12.7	0.0503		
TOTAL HEXA-FURANS		32.3	0.0503		
TOTAL HEPTA-FURANS		74.9	0.0503		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 09:23:13; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-18_Form1A_DX0M_013S5_SJ1106559.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS521-010
Sample Collection:
16-Dec-2009 15:51

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-18 R
Matrix:	SOLID	**Sample Size:**	9.94 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 15:45:30	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	52.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.653	0.0714	0.81	1.000

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 13:54:11; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-18_Form1A_DB0B_031AS10_SJ1106678.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS522-010
Sample Collection:
16-Dec-2009 16:16

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-19 R
Matrix:	SOLID	**Sample Size:**	9.60 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 12:14:39	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 18**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	43.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.660	0.0521	0.78	1.001
1,2,3,7,8-PECDD [3]	J	2.81	0.0521	0.58	1.001
1,2,3,4,7,8-HXCDD	J	5.08	0.0605	1.19	1.000
1,2,3,6,7,8-HXCDD		16.4	0.0605	1.22	1.001
1,2,3,7,8,9-HXCDD		14.1	0.0605	1.28	1.000
1,2,3,4,6,7,8-HPCDD	B	435	0.151	1.02	1.000
OCDD	B	4150	0.0521	0.87	1.000
2,3,7,8-TCDF		4.48	0.0521	0.74	1.002
1,2,3,7,8-PECDF	J	1.01	0.0521	1.44	1.001
2,3,4,7,8-PECDF	J	2.68	0.0521	1.60	1.001
1,2,3,4,7,8-HXCDF		10.4	0.0521	1.18	1.000
1,2,3,6,7,8-HXCDF	J	2.86	0.0521	1.15	1.001
1,2,3,7,8,9-HXCDF	J	0.218	0.0521	1.14	1.000
2,3,4,6,7,8-HXCDF	J	1.99	0.0521	1.16	1.001
1,2,3,4,6,7,8-HPCDF		62.3	0.0899	1.03	1.001
1,2,3,4,7,8,9-HPCDF	J	4.55	0.0899	1.00	1.000
OCDF		290	0.0521	0.86	1.002
TOTAL TETRA-DIOXINS		7.33	0.0521		
TOTAL PENTA-DIOXINS		14.7	0.0521		
TOTAL HEXA-DIOXINS		152	0.0605		
TOTAL HEPTA-DIOXINS	B	1210	0.151		
TOTAL TETRA-FURANS		25.8	0.0521		
TOTAL PENTA-FURANS		39.4	0.0521		
TOTAL HEXA-FURANS		103	0.0521		
TOTAL HEPTA-FURANS		233	0.0899		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 09:23:13; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-19_Form1A_DX0M_012S18_SJ1106145.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS522-010
Sample Collection:
16-Dec-2009 16:16

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-19 R
Matrix:	SOLID	**Sample Size:**	9.60 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 16:56:59	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 12**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	43.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.52	0.234	0.77	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 13:54:11; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-19_Form1A_DB0B_031AS12_SJ1106680.html; Workgroup: WG31593; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS523-010
Sample Collection:
15-Dec-2009 20:30

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-2 R
Matrix:	SOLID	**Sample Size:**	10.6 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 07:58:27	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 16**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 6
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	79.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B J	0.438	0.0470	0.79	1.001
1,2,3,7,8-PECDD [3]	J	1.28	0.0470	0.58	1.001
1,2,3,4,7,8-HXCDD	J	2.37	0.0470	1.18	1.000
1,2,3,6,7,8-HXCDD		8.79	0.0470	1.18	1.000
1,2,3,7,8,9-HXCDD		7.65	0.0470	1.24	1.000
1,2,3,4,6,7,8-HPCDD		311	0.150	1.03	1.000
OCDD	B	3960	0.0470	0.86	1.000
2,3,7,8-TCDF		1.83	0.0470	0.77	1.002
1,2,3,7,8-PECDF	J	0.385	0.0470	1.33	1.001
2,3,4,7,8-PECDF	J	0.837	0.0470	1.44	1.001
1,2,3,4,7,8-HXCDF	J	2.92	0.0470	1.16	1.000
1,2,3,6,7,8-HXCDF	J	1.01	0.0470	1.16	1.001
1,2,3,7,8,9-HXCDF	J	0.104	0.0470	1.25	1.001
2,3,4,6,7,8-HXCDF	J	0.867	0.0470	1.25	1.001
1,2,3,4,6,7,8-HPCDF		27.8	0.0470	1.04	1.000
1,2,3,4,7,8,9-HPCDF	J	1.81	0.0470	0.91	1.000
OCDF		125	0.0470	0.86	1.002
TOTAL TETRA-DIOXINS		2.60	0.0470		
TOTAL PENTA-DIOXINS		6.11	0.0470		
TOTAL HEXA-DIOXINS		77.8	0.0470		
TOTAL HEPTA-DIOXINS		732	0.150		
TOTAL TETRA-FURANS		8.75	0.0470		
TOTAL PENTA-FURANS		14.4	0.0470		
TOTAL HEXA-FURANS		41.8	0.0470		
TOTAL HEPTA-FURANS		91.0	0.0470		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-2_Form1A_DX0M_015S16_SJ1107437.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS523-010
Sample Collection:
15-Dec-2009 20:30

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-2 R
Matrix:	SOLID	**Sample Size:**	10.6 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 09:22:11	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_034 S: 4**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_034 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	79.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.739	0.0622	0.71	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-2_Form1A_DB0B_034S4_SJ1107573.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS524-010
Sample Collection:
17-Dec-2009 07:51

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-25
Matrix:	SOLID	**Sample Size:**	9.33 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	16-Jan-2010 **Time:** 03:51:02	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 16**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 11
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	48.7

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.334	0.0536	0.71	1.001
1,2,3,7,8-PECDD [3]	J	0.815	0.0536	0.59	1.001
1,2,3,4,7,8-HXCDD	J	1.44	0.0536	1.16	1.000
1,2,3,6,7,8-HXCDD	J	5.92	0.0536	1.24	1.000
1,2,3,7,8,9-HXCDD	J	4.46	0.0536	1.22	1.000
1,2,3,4,6,7,8-HPCDD		164	0.0966	1.04	1.000
OCDD	B	1630	0.0536	0.88	1.000
2,3,7,8-TCDF		2.12	0.0536	0.76	1.002
1,2,3,7,8-PECDF	J	0.387	0.0536	1.55	1.001
2,3,4,7,8-PECDF	J	0.914	0.0536	1.55	1.001
1,2,3,4,7,8-HXCDF	J	2.93	0.0536	1.21	1.000
1,2,3,6,7,8-HXCDF	J	1.03	0.0536	1.31	1.000
1,2,3,7,8,9-HXCDF	J	0.071	0.0536	1.21	1.001
2,3,4,6,7,8-HXCDF	J	0.820	0.0536	1.16	1.000
1,2,3,4,6,7,8-HPCDF		23.4	0.0536	1.01	1.000
1,2,3,4,7,8,9-HPCDF	J	1.64	0.0536	0.94	1.001
OCDF		85.0	0.0536	0.85	1.002
TOTAL TETRA-DIOXINS		4.31	0.0536		
TOTAL PENTA-DIOXINS	J	5.69	0.0536		
TOTAL HEXA-DIOXINS		52.1	0.0536		
TOTAL HEPTA-DIOXINS		397	0.0966		
TOTAL TETRA-FURANS		13.4	0.0536		
TOTAL PENTA-FURANS		14.6	0.0536		
TOTAL HEXA-FURANS		33.5	0.0536		
TOTAL HEPTA-FURANS		79.9	0.0536		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:13:47; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-25_Form1A_DX0M_007S16_SJ1100160.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS524-010
Sample Collection:
17-Dec-2009 07:51

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-25
Matrix:	SOLID	**Sample Size:**	9.33 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 01:19:36	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_015 S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_015 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	48.7

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.622	0.0822	0.77	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-25_Form1A_DB0B_015S10_SJ1099712.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS525-010
Sample Collection:
16-Dec-2009 10:15

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-20 R
Matrix:	SOLID	**Sample Size:**	10.0 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 11:55:40	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 20**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	73.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K B J	0.113	0.0499	0.46	1.001
1,2,3,7,8-PECDD [3]	J	0.281	0.0499	0.64	1.001
1,2,3,4,7,8-HXCDD	J	0.473	0.0499	1.06	1.000
1,2,3,6,7,8-HXCDD	J	1.70	0.0499	1.18	1.000
1,2,3,7,8,9-HXCDD	J	1.57	0.0499	1.22	1.000
1,2,3,4,6,7,8-HPCDD		47.9	0.0718	1.01	1.000
OCDD	B	487	0.0499	0.87	1.000
2,3,7,8-TCDF	J	0.368	0.0499	0.83	1.003
1,2,3,7,8-PECDF	J	0.094	0.0499	1.70	1.002
2,3,4,7,8-PECDF	J	0.236	0.0499	1.45	1.001
1,2,3,4,7,8-HXCDF	J	1.01	0.0499	1.16	1.000
1,2,3,6,7,8-HXCDF	J	0.299	0.0499	1.19	1.000
1,2,3,7,8,9-HXCDF	J	0.148	0.0499	1.33	1.004
2,3,4,6,7,8-HXCDF	J	0.247	0.0499	1.23	1.001
1,2,3,4,6,7,8-HPCDF		8.46	0.0499	0.99	1.000
1,2,3,4,7,8,9-HPCDF	J	0.505	0.0499	1.01	1.001
OCDF		48.6	0.0499	0.85	1.002
TOTAL TETRA-DIOXINS		0.247	0.0499		
TOTAL PENTA-DIOXINS		1.52	0.0499		
TOTAL HEXA-DIOXINS		16.3	0.0499		
TOTAL HEPTA-DIOXINS		122	0.0718		
TOTAL TETRA-FURANS		1.99	0.0499		
TOTAL PENTA-FURANS		3.40	0.0499		
TOTAL HEXA-FURANS		9.53	0.0499		
TOTAL HEPTA-FURANS		27.4	0.0499		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-20_Form1A_DX0M_015S20_SJ1108227.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS526-010
Sample Collection:
16-Dec-2009 09:40

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-21
Matrix:	SOLID	**Sample Size:**	10.5 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	16-Jan-2010 **Time:** 06:36:09	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 19**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 11
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.524	0.0478	0.68	1.001
1,2,3,7,8-PECDD [3]	J	3.31	0.0478	0.59	1.001
1,2,3,4,7,8-HXCDD		6.78	0.0478	1.31	1.001
1,2,3,6,7,8-HXCDD		19.1	0.0478	1.22	1.000
1,2,3,7,8,9-HXCDD		18.8	0.0478	1.22	1.001
1,2,3,4,6,7,8-HPCDD		502	0.128	0.95	1.000
OCDD	E				
2,3,7,8-TCDF		4.35	0.0478	0.73	1.002
1,2,3,7,8-PECDF	J	0.538	0.0478	1.39	1.001
2,3,4,7,8-PECDF	J	1.44	0.0478	1.48	1.001
1,2,3,4,7,8-HXCDF		4.98	0.0478	1.19	1.000
1,2,3,6,7,8-HXCDF	J	2.24	0.0478	1.23	1.001
1,2,3,7,8,9-HXCDF	J	0.129	0.0478	1.12	1.001
2,3,4,6,7,8-HXCDF	J	1.79	0.0478	1.22	1.001
1,2,3,4,6,7,8-HPCDF		74.7	0.0478	1.01	1.000
1,2,3,4,7,8,9-HPCDF	J	4.72	0.0478	1.03	1.000
OCDF		205	0.0478	0.86	1.002
TOTAL TETRA-DIOXINS		5.67	0.0478		
TOTAL PENTA-DIOXINS		14.9	0.0478		
TOTAL HEXA-DIOXINS		139	0.0478		
TOTAL HEPTA-DIOXINS		1030	0.128		
TOTAL TETRA-FURANS		22.7	0.0478		
TOTAL PENTA-FURANS		29.1	0.0478		
TOTAL HEXA-FURANS		72.9	0.0478		
TOTAL HEPTA-FURANS		186	0.0478		

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL; E = exceeds calibrated linear range, see dilution data.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-21_Form1A_DX0M_007S19_SJ1100163.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS526-010
Sample Collection:
16-Dec-2009 09:40

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-21 W
Matrix:	SOLID	**Sample Size:**	10.5 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	27-Jan-2010 **Time:** 05:11:01	**GC Column ID:**	DB5
Extract Volume (uL):	80	**Sample Data Filename:**	**DX0M_011 S: 11**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	4	**Cal. Ver. Data Filename:**	DX0M_011 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	X				
1,2,3,7,8-PECDD [3]	X				
1,2,3,4,7,8-HXCDD	X				
1,2,3,6,7,8-HXCDD	X				
1,2,3,7,8,9-HXCDD	X				
1,2,3,4,6,7,8-HPCDD	X				
OCDD	B D	4480	0.157	0.88	1.000
2,3,7,8-TCDF	X				
1,2,3,7,8-PECDF	X				
2,3,4,7,8-PECDF	X				
1,2,3,4,7,8-HXCDF	X				
1,2,3,6,7,8-HXCDF	X				
1,2,3,7,8,9-HXCDF	X				
2,3,4,6,7,8-HXCDF	X				
1,2,3,4,6,7,8-HPCDF	X				
1,2,3,4,7,8,9-HPCDF	X				
OCDF	X				
TOTAL TETRA-DIOXINS	X				
TOTAL PENTA-DIOXINS	X				
TOTAL HEXA-DIOXINS	X				
TOTAL HEPTA-DIOXINS	X				
TOTAL TETRA-FURANS	X				
TOTAL PENTA-FURANS	X				
TOTAL HEXA-FURANS	X				
TOTAL HEPTA-FURANS	X				

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; D = dilution data; X = result reported separately.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:13:47; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-21_Form1A_DX0M_011S11_SJ1104543.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS526-010
Sample Collection:
16-Dec-2009 09:40

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-21
Matrix:	SOLID	**Sample Size:**	10.5 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	14-Jan-2010 **Time:** 22:56:22	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_015 S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_015 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.983	0.141	0.87	1.000

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-21_Form1A_DB0B_015S6_SJ1099708.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS527-010
Sample Collection:
17-Dec-2009 08:17

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-26
Matrix:	SOLID	**Sample Size:**	9.49 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	16-Jan-2010 **Time:** 04:46:04	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 17**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 11
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	45.7

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.306	0.0527	0.79	1.002
1,2,3,7,8-PECDD [3]	J	0.706	0.0527	0.62	1.001
1,2,3,4,7,8-HXCDD	J	1.12	0.0527	1.21	1.000
1,2,3,6,7,8-HXCDD	J	3.98	0.0527	1.20	1.001
1,2,3,7,8,9-HXCDD	J	3.65	0.0527	1.17	1.000
1,2,3,4,6,7,8-HPCDD		98.5	0.0726	1.00	1.000
OCDD	B	970	0.119	0.88	1.000
2,3,7,8-TCDF		1.68	0.0527	0.72	1.002
1,2,3,7,8-PECDF	J	0.329	0.0527	1.68	1.001
2,3,4,7,8-PECDF	J	0.763	0.0527	1.51	1.001
1,2,3,4,7,8-HXCDF	J	2.65	0.0527	1.28	1.001
1,2,3,6,7,8-HXCDF	J	0.890	0.0527	1.33	1.000
1,2,3,7,8,9-HXCDF	J	0.077	0.0527	1.10	1.000
2,3,4,6,7,8-HXCDF	J	0.660	0.0527	1.37	1.000
1,2,3,4,6,7,8-HPCDF		17.6	0.0527	1.00	1.000
1,2,3,4,7,8,9-HPCDF	J	1.36	0.0527	1.07	1.000
OCDF		66.1	0.0527	0.87	1.002
TOTAL TETRA-DIOXINS		3.33	0.0527		
TOTAL PENTA-DIOXINS	J	5.30	0.0527		
TOTAL HEXA-DIOXINS		36.6	0.0527		
TOTAL HEPTA-DIOXINS		271	0.0726		
TOTAL TETRA-FURANS		11.4	0.0527		
TOTAL PENTA-FURANS		11.9	0.0527		
TOTAL HEXA-FURANS		28.3	0.0527		
TOTAL HEPTA-FURANS		59.9	0.0527		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-26_Form1A_DX0M_007S17_SJ1100161.html; Workgroup: WG31355; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS527-010
Sample Collection:
17-Dec-2009 08:17

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-26
Matrix:	SOLID	**Sample Size:**	9.49 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 01:55:24	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_015 S: 11**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_015 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	45.7

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.608	0.0527	0.73	1.002

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:16:21; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-26_Form1A_DB0B_015S11_SJ1099713.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS528-010
Sample Collection:
16-Dec-2009 09:12

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-22
Matrix:	SOLID	**Sample Size:**	9.32 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	16-Jan-2010 **Time:** 08:26:03	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 21**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 11
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	40.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.790	0.0536	0.70	1.001
1,2,3,7,8-PECDD [3]	J	2.89	0.0536	0.60	1.001
1,2,3,4,7,8-HXCDD	J	5.00	0.0536	1.19	1.000
1,2,3,6,7,8-HXCDD		16.2	0.0536	1.22	1.000
1,2,3,7,8,9-HXCDD		14.2	0.0536	1.19	1.000
1,2,3,4,6,7,8-HPCDD		357	0.105	1.01	1.000
OCDD	B	3330	0.0536	0.88	1.000
2,3,7,8-TCDF		9.64	0.0536	0.76	1.002
1,2,3,7,8-PECDF	J	2.07	0.0536	1.54	1.001
2,3,4,7,8-PECDF		5.17	0.0536	1.46	1.001
1,2,3,4,7,8-HXCDF		18.5	0.0536	1.21	1.001
1,2,3,6,7,8-HXCDF		7.39	0.0536	1.23	1.000
1,2,3,7,8,9-HXCDF	J	0.340	0.0536	1.34	1.000
2,3,4,6,7,8-HXCDF	J	3.52	0.0536	1.19	1.000
1,2,3,4,6,7,8-HPCDF		65.2	0.0636	1.01	1.000
1,2,3,4,7,8,9-HPCDF		7.35	0.0636	0.94	1.000
OCDF		205	0.0536	0.88	1.002
TOTAL TETRA-DIOXINS		12.0	0.0536		
TOTAL PENTA-DIOXINS		21.1	0.0536		
TOTAL HEXA-DIOXINS		145	0.0536		
TOTAL HEPTA-DIOXINS		892	0.105		
TOTAL TETRA-FURANS		85.6	0.0536		
TOTAL PENTA-FURANS		90.6	0.0536		
TOTAL HEXA-FURANS		139	0.0536		
TOTAL HEPTA-FURANS		206	0.0636		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:13:47; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-22_Form1A_DX0M_007S21_SJ1100165.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS528-010
Sample Collection:
16-Dec-2009 09:12

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-22
Matrix:	SOLID	**Sample Size:**	9.32 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	14-Jan-2010 **Time:** 23:32:10	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_015 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_015 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	40.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		5.54	0.256	0.77	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:16:21; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-22_Form1A_DB0B_015S7_SJ1099709.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS529-041-COMP
Sample Collection:
11-Jan-2010 20:56

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-3
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 17:33:25	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 9**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	76.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD		0.459	0.0482	0.74	1.001
1,2,3,7,8-PECDD [3]		1.53	0.0482	0.61	1.001
1,2,3,4,7,8-HXCDD		2.47	0.0482	1.22	1.000
1,2,3,6,7,8-HXCDD		8.11	0.0482	1.21	1.000
1,2,3,7,8,9-HXCDD		6.80	0.0482	1.27	1.000
1,2,3,4,6,7,8-HPCDD		230	0.0753	1.01	1.000
OCDD	B	2370	0.0482	0.88	1.000
2,3,7,8-TCDF		5.92	0.0482	0.77	1.002
1,2,3,7,8-PECDF		1.02	0.0482	1.68	1.001
2,3,4,7,8-PECDF		2.06	0.0482	1.37	1.001
1,2,3,4,7,8-HXCDF		5.53	0.0482	1.22	1.000
1,2,3,6,7,8-HXCDF		2.34	0.0482	1.15	1.000
1,2,3,7,8,9-HXCDF	J	0.146	0.0482	1.35	1.000
2,3,4,6,7,8-HXCDF		1.81	0.0482	1.18	1.000
1,2,3,4,6,7,8-HPCDF		34.2	0.0482	1.03	1.000
1,2,3,4,7,8,9-HPCDF		3.25	0.0482	0.97	1.001
OCDF	B	151	0.0565	0.85	1.002
TOTAL TETRA-DIOXINS		12.0	0.0482		
TOTAL PENTA-DIOXINS		18.2	0.0482		
TOTAL HEXA-DIOXINS		64.8	0.0482		
TOTAL HEPTA-DIOXINS		427	0.0753		
TOTAL TETRA-FURANS		34.4	0.0482		
TOTAL PENTA-FURANS		32.2	0.0482		
TOTAL HEXA-FURANS		55.5	0.0482		
TOTAL HEPTA-FURANS		128	0.0482		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14159-3_Form1A_DX0M_019S9_SJ1112383.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS529-041-COMP
Sample Collection:
11-Jan-2010 20:56

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-3
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 14:01:28	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	76.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.98	0.132	0.72	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 23-Feb-2010 14:53:00; Application: XMLTransformer-1.10.17;
Report Filename: 1613_DIOXINS_1613DB225_L14159-3_Form1A_DB0B_039S8_SJ1111276.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS530-010
Sample Collection:
15-Dec-2009 21:23

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-3 R
Matrix:	SOLID	**Sample Size:**	9.98 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	03-Feb-2010 **Time:** 15:35:49	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_015 S: 24**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_015 S: 13
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_015 S: 17
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	62.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	B	1.77	0.0501	0.78	1.001
1,2,3,7,8-PECDD [3]		7.19	0.0501	0.60	1.001
1,2,3,4,7,8-HXCDD		10.6	0.0676	1.21	1.000
1,2,3,6,7,8-HXCDD		39.2	0.0676	1.20	1.000
1,2,3,7,8,9-HXCDD		32.9	0.0676	1.23	1.000
1,2,3,4,6,7,8-HPCDD		1030	0.226	1.01	1.000
OCDD	B	9590	0.0501	0.87	1.000
2,3,7,8-TCDF		11.6	0.0501	0.74	1.002
1,2,3,7,8-PECDF	J	2.21	0.0501	1.46	1.000
2,3,4,7,8-PECDF		4.83	0.0501	1.56	1.000
1,2,3,4,7,8-HXCDF		10.8	0.0501	1.17	1.001
1,2,3,6,7,8-HXCDF		5.23	0.0501	1.20	1.000
1,2,3,7,8,9-HXCDF	J	0.365	0.0501	1.15	1.000
2,3,4,6,7,8-HXCDF	J	4.86	0.0501	1.18	1.000
1,2,3,4,6,7,8-HPCDF		95.5	0.0728	1.03	1.000
1,2,3,4,7,8,9-HPCDF		6.76	0.0728	0.97	1.000
OCDF		303	0.0501	0.86	1.002
TOTAL TETRA-DIOXINS		18.1	0.0501		
TOTAL PENTA-DIOXINS		42.9	0.0501		
TOTAL HEXA-DIOXINS		463	0.0676		
TOTAL HEPTA-DIOXINS		4510	0.226		
TOTAL TETRA-FURANS		84.5	0.0501		
TOTAL PENTA-FURANS		125	0.0501		
TOTAL HEXA-FURANS		184	0.0501		
TOTAL HEPTA-FURANS		314	0.0728		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-3_Form1A_DX0M_015S24_SJ1108231.html; Workgroup: WG31628; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS530-010
Sample Collection:
15-Dec-2009 21:23

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-3 R
Matrix:	SOLID	**Sample Size:**	9.98 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	27-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	02-Feb-2010 **Time:** 23:15:56	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_033 S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_033 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	62.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		5.37	0.422	0.80	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-3_Form1A_DB0B_033S6_SJ1107309.html; Workgroup: WG31628; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS531-010-COMP
Sample Collection:
12-Jan-2010 20:30

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-4
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 18:28:28	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	75.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.126	0.0467	0.56	1.001
1,2,3,7,8-PECDD [3]	J	0.354	0.0467	0.63	1.001
1,2,3,4,7,8-HXCDD	J	0.544	0.0467	1.17	1.000
1,2,3,6,7,8-HXCDD		1.85	0.0467	1.17	1.000
1,2,3,7,8,9-HXCDD		1.60	0.0467	1.20	1.000
1,2,3,4,6,7,8-HPCDD		38.6	0.0528	0.99	1.000
OCDD	B	365	0.0467	0.86	1.000
2,3,7,8-TCDF		0.703	0.0467	0.79	1.001
1,2,3,7,8-PECDF	J	0.212	0.0467	1.41	1.001
2,3,4,7,8-PECDF	J	0.298	0.0467	1.59	1.001
1,2,3,4,7,8-HXCDF	J	0.692	0.0467	1.19	1.001
1,2,3,6,7,8-HXCDF	J	0.369	0.0467	1.23	1.000
1,2,3,7,8,9-HXCDF	U		0.0467		
2,3,4,6,7,8-HXCDF	J	0.293	0.0467	1.24	1.000
1,2,3,4,6,7,8-HPCDF		6.47	0.0467	1.03	1.000
1,2,3,4,7,8,9-HPCDF	J	0.361	0.0467	1.12	1.000
OCDF	B	19.0	0.0467	0.87	1.002
TOTAL TETRA-DIOXINS		2.30	0.0467		
TOTAL PENTA-DIOXINS		3.67	0.0467		
TOTAL HEXA-DIOXINS		17.6	0.0467		
TOTAL HEPTA-DIOXINS		126	0.0528		
TOTAL TETRA-FURANS		4.67	0.0467		
TOTAL PENTA-FURANS		6.97	0.0467		
TOTAL HEXA-FURANS		12.3	0.0467		
TOTAL HEPTA-FURANS		19.4	0.0467		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 23-Feb-2010 14:52:27; Application: XMLTransformer-1.10.17;
Report Filename: 1613_DIOXINS_1613DB5_L14159-4_Form1A_DX0M_019S10_SJ1112371.html; Workgroup: WG31619; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS531-010-COMP
Sample Collection:
12-Jan-2010 20:30

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-4
Matrix:	SOLID	**Sample Size:**	10.7 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 14:37:21	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 9**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	75.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.410	0.0990	0.75	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14159-4_Form1A_DB0B_039S9_SJ1111277.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS532-010
Sample Collection:
17-Dec-2009 08:43

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-27
Matrix:	SOLID	**Sample Size:**	11.0 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	16-Jan-2010 **Time:** 05:41:07	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 18**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 11
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.197	0.0455	0.67	1.002
1,2,3,7,8-PECDD [3]	J	0.524	0.0455	0.66	1.001
1,2,3,4,7,8-HXCDD	J	0.744	0.0455	1.32	1.000
1,2,3,6,7,8-HXCDD	J	2.60	0.0455	1.13	1.000
1,2,3,7,8,9-HXCDD	J	2.27	0.0455	1.27	1.000
1,2,3,4,6,7,8-HPCDD		62.7	0.0849	0.99	1.000
OCDD	B	737	0.0455	0.85	1.000
2,3,7,8-TCDF		1.74	0.0455	0.77	1.002
1,2,3,7,8-PECDF	J	0.357	0.0455	1.44	1.001
2,3,4,7,8-PECDF	J	0.773	0.0455	1.36	1.001
1,2,3,4,7,8-HXCDF	J	1.76	0.0455	1.16	1.001
1,2,3,6,7,8-HXCDF	J	0.745	0.0455	1.20	1.001
1,2,3,7,8,9-HXCDF	K J	0.053	0.0455	2.31	1.000
2,3,4,6,7,8-HXCDF	J	0.604	0.0455	1.38	1.000
1,2,3,4,6,7,8-HPCDF		14.0	0.0455	0.98	1.000
1,2,3,4,7,8,9-HPCDF	J	0.864	0.0455	0.98	1.000
OCDF		43.6	0.0455	0.85	1.002
TOTAL TETRA-DIOXINS		3.32	0.0455		
TOTAL PENTA-DIOXINS	J	4.47	0.0455		
TOTAL HEXA-DIOXINS		29.4	0.0455		
TOTAL HEPTA-DIOXINS		251	0.0849		
TOTAL TETRA-FURANS		16.3	0.0455		
TOTAL PENTA-FURANS		16.0	0.0455		
TOTAL HEXA-FURANS		21.5	0.0455		
TOTAL HEPTA-FURANS		39.2	0.0455		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-27_Form1A_DX0M_007S18_SJ1100162.html; Workgroup: WG31355; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS532-010
Sample Collection:
17-Dec-2009 08:43

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-27
Matrix:	SOLID	**Sample Size:**	11.0 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 02:31:14	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_015 S: 12**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_015 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.765	0.102	0.81	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:16:21; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-27_Form1A_DB0B_015S12_SJ1099714.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS533-043-COMP
Sample Collection:
12-Jan-2010 21:39

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-5
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 19:23:29	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 11**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	73.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD		0.403	0.0480	0.74	1.001
1,2,3,7,8-PECDD [3]		1.22	0.0480	0.65	1.001
1,2,3,4,7,8-HXCDD		1.88	0.0480	1.27	1.000
1,2,3,6,7,8-HXCDD		6.10	0.0480	1.19	1.001
1,2,3,7,8,9-HXCDD		5.30	0.0480	1.22	1.000
1,2,3,4,6,7,8-HPCDD		122	0.0861	1.03	1.000
OCDD	B	980	0.0524	0.88	1.000
2,3,7,8-TCDF		2.20	0.0480	0.76	1.002
1,2,3,7,8-PECDF	J	0.541	0.0480	1.34	1.001
2,3,4,7,8-PECDF		1.24	0.0480	1.36	1.001
1,2,3,4,7,8-HXCDF		6.86	0.0480	1.16	1.001
1,2,3,6,7,8-HXCDF		1.78	0.0480	1.26	1.000
1,2,3,7,8,9-HXCDF	J	0.150	0.0480	1.33	1.001
2,3,4,6,7,8-HXCDF		1.22	0.0480	1.13	1.000
1,2,3,4,6,7,8-HPCDF		32.0	0.0496	1.02	1.000
1,2,3,4,7,8,9-HPCDF		3.29	0.0496	1.08	1.000
OCDF	B	86.2	0.0480	0.84	1.002
TOTAL TETRA-DIOXINS		6.20	0.0480		
TOTAL PENTA-DIOXINS		9.20	0.0480		
TOTAL HEXA-DIOXINS		47.3	0.0480		
TOTAL HEPTA-DIOXINS		242	0.0861		
TOTAL TETRA-FURANS		18.1	0.0480		
TOTAL PENTA-FURANS		28.4	0.0480		
TOTAL HEXA-FURANS		60.0	0.0480		
TOTAL HEPTA-FURANS		108	0.0496		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 23-Feb-2010 14:52:27; Application: XMLTransformer-1.10.17;
Report Filename: 1613_DIOXINS_1613DB5_L14159-5_Form1A_DX0M_019S11_SJ1112372.html; Workgroup: WG31619; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS533-043-COMP
Sample Collection:
12-Jan-2010 21:39

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-5
Matrix:	SOLID	**Sample Size:**	10.4 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 15:13:14	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	73.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	K J	0.998	0.174	0.96	1.001

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 23-Feb-2010 14:53:00; Application: XMLTransformer-1.10.17;
Report Filename: 1613_DIOXINS_1613DB225_L14159-5_Form1A_DB0B_039S10_SJ1111278.html; Workgroup: WG31619; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS534-010
Sample Collection:
17-Dec-2009 08:56

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-28 R (A)
Matrix:	SOLID	**Sample Size:**	10.9 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 13:09:41	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 19**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	71.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.169	0.0457	0.66	1.002
1,2,3,7,8-PECDD [3]	J	0.387	0.0457	0.58	1.001
1,2,3,4,7,8-HXCDD	J	0.670	0.0457	1.27	1.000
1,2,3,6,7,8-HXCDD	J	2.42	0.0457	1.10	1.000
1,2,3,7,8,9-HXCDD	J	1.97	0.0457	1.21	1.000
1,2,3,4,6,7,8-HPCDD	B	59.4	0.0540	0.97	1.000
OCDD	B	683	0.0457	0.87	1.000
2,3,7,8-TCDF		1.04	0.0457	0.70	1.002
1,2,3,7,8-PECDF	J	0.234	0.0457	1.45	1.001
2,3,4,7,8-PECDF	J	0.450	0.0457	1.67	1.001
1,2,3,4,7,8-HXCDF	J	1.56	0.0457	1.23	1.001
1,2,3,6,7,8-HXCDF	J	0.522	0.0457	1.18	1.000
1,2,3,7,8,9-HXCDF	U		0.0457		
2,3,4,6,7,8-HXCDF	J	0.449	0.0457	1.07	1.000
1,2,3,4,6,7,8-HPCDF		10.7	0.0457	1.00	1.000
1,2,3,4,7,8,9-HPCDF	J	0.757	0.0457	1.08	1.000
OCDF		43.7	0.0457	0.87	1.002
TOTAL TETRA-DIOXINS		1.59	0.0457		
TOTAL PENTA-DIOXINS		2.46	0.0457		
TOTAL HEXA-DIOXINS		22.9	0.0457		
TOTAL HEPTA-DIOXINS	B	214	0.0540		
TOTAL TETRA-FURANS		6.45	0.0457		
TOTAL PENTA-FURANS		8.37	0.0457		
TOTAL HEXA-FURANS		17.1	0.0457		
TOTAL HEPTA-FURANS		37.7	0.0457		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 09:23:13; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_L14065-28_Form1A_DX0M_012S19_SJ1106146.html; Workgroup: WG31593; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS534-010
Sample Collection:
17-Dec-2009 08:56

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-28 R (A)
Matrix:	SOLID	**Sample Size:**	10.9 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 13:58:25	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	71.8

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	K J	0.452	0.0796	0.97	1.000

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 03-Feb-2010 13:54:11; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-28_Form1A_DB0B_031AS7_SJ1106675.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS534-010 (Duplicate)
Sample Collection:
17-Dec-2009 08:56

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	WG31593-103 (DUP L14065-28)
Matrix:	SOLID	**Sample Size:**	10.9 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 14:04:37	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 20**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	72.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.189	0.0461	0.66	1.001
1,2,3,7,8-PECDD [3]	J	0.353	0.0461	0.69	1.001
1,2,3,4,7,8-HXCDD	J	0.590	0.0461	1.29	1.000
1,2,3,6,7,8-HXCDD	J	2.41	0.0461	1.25	1.000
1,2,3,7,8,9-HXCDD	J	1.80	0.0461	1.33	1.000
1,2,3,4,6,7,8-HPCDD	B	59.1	0.0751	1.05	1.000
OCDD	B	580	0.0461	0.86	1.000
2,3,7,8-TCDF		1.02	0.0461	0.78	1.001
1,2,3,7,8-PECDF	J	0.228	0.0461	1.75	1.001
2,3,4,7,8-PECDF	J	0.560	0.0461	1.60	1.001
1,2,3,4,7,8-HXCDF	J	2.75	0.0461	1.07	1.000
1,2,3,6,7,8-HXCDF	J	0.634	0.0461	1.09	1.000
1,2,3,7,8,9-HXCDF	U		0.0461		
2,3,4,6,7,8-HXCDF	J	0.495	0.0461	1.37	1.000
1,2,3,4,6,7,8-HPCDF		12.1	0.0461	0.99	1.000
1,2,3,4,7,8,9-HPCDF	J	1.18	0.0461	0.92	1.000
OCDF		45.5	0.0461	0.86	1.002
TOTAL TETRA-DIOXINS		2.57	0.0461		
TOTAL PENTA-DIOXINS		2.79	0.0461		
TOTAL HEXA-DIOXINS		20.0	0.0461		
TOTAL HEPTA-DIOXINS	B	146	0.0751		
TOTAL TETRA-FURANS		6.30	0.0461		
TOTAL PENTA-FURANS		8.38	0.0461		
TOTAL HEXA-FURANS		19.8	0.0461		
TOTAL HEPTA-FURANS		41.0	0.0461		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_WG31593-103_Form1A_DX0M_012S20_SJ1106147.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS534-010 (Duplicate)
Sample Collection:
17-Dec-2009 08:56

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	WG31593-103 (DUP L14065-28)
Matrix:	SOLID	**Sample Size:**	10.9 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	01-Feb-2010 **Time:** 14:34:06	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_031A S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	N/A
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_031A S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	72.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.389	0.0785	0.88	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_WG31593-103_Form1A_DB0B_031AS8_SJ1106676.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

PCDD/PCDF ANALYSIS REPORT
RELATIVE PERCENT DIFFERENCE

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

Project No. LDW DIOXIN AND FURAN SAMPLING

Contract No.: 4033

Client ID: LDW-SS534-010

Concentration Units: ng/kg (dry weight basis)

COMPOUND	L14065-28 (A) LAB FLAG [1]	L14065-28 (A) CONC. FOUND	WG31593-103 LAB FLAG [1]	WG31593-103 CONC. FOUND	MEAN	RELATIVE PERCENT DIFFERENCE
2,3,7,8-TCDD	J	0.169	J	0.189	0.179	11.3
1,2,3,7,8-PECDD	J	0.387	J	0.353	0.370	9.22
1,2,3,4,7,8-HXCDD	J	0.670	J	0.590	0.630	12.6
1,2,3,6,7,8-HXCDD	J	2.42	J	2.41	2.41	0.615
1,2,3,7,8,9-HXCDD	J	1.97	J	1.80	1.89	8.92
1,2,3,4,6,7,8-HPCDD		59.4		59.1	59.3	0.403
OCDD		683		580	631	16.3
2,3,7,8-TCDF	K J	0.452	J	0.389		
1,2,3,7,8-PECDF	J	0.234	J	0.228	0.231	2.52
2,3,4,7,8-PECDF	J	0.450	J	0.560	0.505	21.9
1,2,3,4,7,8-HXCDF	J	1.56	J	2.75	2.15	55.4
1,2,3,6,7,8-HXCDF	J	0.522	J	0.634	0.578	19.4
1,2,3,7,8,9-HXCDF	U		U			
2,3,4,6,7,8-HXCDF	J	0.449	J	0.495	0.472	9.63
1,2,3,4,6,7,8-HPCDF		10.7		12.1	11.4	12.7
1,2,3,4,7,8,9-HPCDF	J	0.757	J	1.18	0.970	43.9
OCDF		43.7		45.5	44.6	4.05

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: RPD_DIOXINS_1613-RPD_WG31593-103_L14065-28_.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS535-010
Sample Collection:
17-Dec-2009 09:29

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-29 i3
Matrix:	SOLID	**Sample Size:**	9.55 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	21-Jan-2010 **Time:** 20:04:00	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_009 S: 12**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_009 S: 8
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	67.0

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.303	0.0524	0.61	1.001
1,2,3,7,8-PECDD [3]	J	1.43	0.0524	0.55	1.001
1,2,3,4,7,8-HXCDD	J	2.26	0.0524	1.41	1.000
1,2,3,6,7,8-HXCDD		6.20	0.0524	1.20	1.000
1,2,3,7,8,9-HXCDD		6.09	0.0524	1.19	1.001
1,2,3,4,6,7,8-HPCDD		142	0.0702	1.03	1.000
OCDD	B	1520	0.0524	0.86	1.000
2,3,7,8-TCDF		2.34	0.0524	0.81	1.001
1,2,3,7,8-PECDF	J	0.617	0.0524	1.49	1.001
2,3,4,7,8-PECDF	J	1.53	0.0524	1.41	1.001
1,2,3,4,7,8-HXCDF	J	4.70	0.0524	1.22	1.000
1,2,3,6,7,8-HXCDF	J	1.97	0.0524	1.14	1.000
1,2,3,7,8,9-HXCDF	K J	0.084	0.0524	1.00	1.001
2,3,4,6,7,8-HXCDF	J	1.40	0.0524	1.20	1.000
1,2,3,4,6,7,8-HPCDF		25.4	0.0524	0.97	1.000
1,2,3,4,7,8,9-HPCDF	J	2.10	0.0524	0.88	1.000
OCDF		87.6	0.0524	0.86	1.002
TOTAL TETRA-DIOXINS		3.55	0.0524		
TOTAL PENTA-DIOXINS		7.85	0.0524		
TOTAL HEXA-DIOXINS		58.0	0.0524		
TOTAL HEPTA-DIOXINS		515	0.0702		
TOTAL TETRA-FURANS		18.3	0.0524		
TOTAL PENTA-FURANS		32.5	0.0524		
TOTAL HEXA-FURANS		49.4	0.0524		
TOTAL HEPTA-FURANS		81.0	0.0524		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-29_Form1A_DX0M_009S12_SJ1102699.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS535-010
Sample Collection:
17-Dec-2009 09:29

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-29
Matrix:	SOLID	**Sample Size:**	9.55 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 03:42:49	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_015 S: 14**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_015 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	67.0

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.23	0.122	0.69	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-29_Form1A_DB0B_015S14_SJ1099716.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS536-010
Sample Collection:
17-Dec-2009 09:44

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-30 Li (A)
Matrix:	SOLID	**Sample Size:**	10.0 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	21-Jan-2010 **Time:** 13:18:37	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_009 S: 5**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_009 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.138	0.0500	0.68	1.001
1,2,3,7,8-PECDD [3]	K J	0.205	0.0500	0.41	1.001
1,2,3,4,7,8-HXCDD	J	0.368	0.0500	1.38	1.000
1,2,3,6,7,8-HXCDD	J	1.14	0.0500	1.24	1.001
1,2,3,7,8,9-HXCDD	J	1.03	0.0500	1.08	1.000
1,2,3,4,6,7,8-HPCDD		26.9	0.0500	1.04	1.000
OCDD	B	291	0.0500	0.87	1.000
2,3,7,8-TCDF	J	0.535	0.0500	0.77	1.001
1,2,3,7,8-PECDF	J	0.107	0.0500	1.76	1.001
2,3,4,7,8-PECDF	J	0.215	0.0500	1.52	1.001
1,2,3,4,7,8-HXCDF	J	0.662	0.0500	1.42	1.000
1,2,3,6,7,8-HXCDF	J	0.249	0.0500	1.24	1.000
1,2,3,7,8,9-HXCDF	U		0.0500		
2,3,4,6,7,8-HXCDF	J	0.211	0.0500	1.40	1.001
1,2,3,4,6,7,8-HPCDF		5.15	0.118	1.15	1.000
1,2,3,4,7,8,9-HPCDF	J	0.401	0.118	1.02	1.000
OCDF		18.2	0.0500	0.87	1.002
TOTAL TETRA-DIOXINS	J	0.912	0.0500		
TOTAL PENTA-DIOXINS	J	1.51	0.0500		
TOTAL HEXA-DIOXINS		9.74	0.0500		
TOTAL HEPTA-DIOXINS		64.2	0.0500		
TOTAL TETRA-FURANS		4.05	0.0500		
TOTAL PENTA-FURANS	J	3.52	0.0500		
TOTAL HEXA-FURANS		7.84	0.0500		
TOTAL HEPTA-FURANS		15.5	0.118		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-30_Form1A_DX0M_009S5_SJ1102809.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS536-010
Sample Collection:
17-Dec-2009 09:44

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-30 L (A)
Matrix:	SOLID	**Sample Size:**	9.55 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 23:41:53	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_021 S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_021 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.271	0.0524	0.80	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-30_Form1A_DB0B_021S6_SJ1102745.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS536-010 (Duplicate)
Sample Collection:
17-Dec-2009 09:44

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

Project No.	LDW DIOXIN AND FURAN SAMPLING		
Contract No.:	4033	**Lab Sample I.D.:**	WG31355-103 (DUP L14065-30)
Matrix:	SOLID	**Sample Size:**	9.71 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 20:21:39	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	67.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.171	0.0688	0.68	1.002
1,2,3,7,8-PECDD [3]	J	0.260	0.0515	0.68	1.001
1,2,3,4,7,8-HXCDD	J	0.383	0.0515	1.24	1.000
1,2,3,6,7,8-HXCDD	J	1.21	0.0515	1.14	1.000
1,2,3,7,8,9-HXCDD	J	1.16	0.0515	1.28	1.000
1,2,3,4,6,7,8-HPCDD		23.9	0.0515	1.04	1.000
OCDD	B	233	0.0515	0.87	1.000
2,3,7,8-TCDF	J	0.449	0.0515	0.79	1.001
1,2,3,7,8-PECDF	K J	0.102	0.0515	1.25	1.001
2,3,4,7,8-PECDF	J	0.215	0.0515	1.48	1.001
1,2,3,4,7,8-HXCDF	J	0.637	0.0515	1.27	1.001
1,2,3,6,7,8-HXCDF	J	0.239	0.0515	1.21	1.000
1,2,3,7,8,9-HXCDF	U		0.0515		
2,3,4,6,7,8-HXCDF	J	0.184	0.0515	1.24	1.000
1,2,3,4,6,7,8-HPCDF	J	4.66	0.0515	0.97	1.000
1,2,3,4,7,8,9-HPCDF	J	0.335	0.0515	0.96	1.000
OCDF		16.0	0.0515	0.88	1.002
TOTAL TETRA-DIOXINS		1.40	0.0688		
TOTAL PENTA-DIOXINS	J	1.56	0.0515		
TOTAL HEXA-DIOXINS		10.7	0.0515		
TOTAL HEPTA-DIOXINS		58.6	0.0515		
TOTAL TETRA-FURANS		3.24	0.0515		
TOTAL PENTA-FURANS	J	3.35	0.0515		
TOTAL HEXA-FURANS		7.15	0.0515		
TOTAL HEPTA-FURANS		13.8	0.0515		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:13:47; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB5_WG31355-103_Form1A_DX0M_007S8_SJ1100156.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

Form 1A

PCDD/PCDF ANALYSIS REPORT

CLIENT SAMPLE NO.
LDW-SS536-010 (Duplicate)
Sample Collection:
17-Dec-2009 09:44

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	WG31355-103 i2 (DUP L14065-30)
Matrix:	SOLID	**Sample Size:**	9.71 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 11:47:29	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_020 S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_020 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	67.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.167	0.0515	0.77	1.002

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_WG31355-103_Form1A_DB0B_020S6_SJ1102730.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

PCDD/PCDF ANALYSIS REPORT
RELATIVE PERCENT DIFFERENCE

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

Project No. LDW DIOXIN AND FURAN SAMPLING

Contract No.: 4033

Client ID: LDW-SS536-010

Concentration Units: ng/kg (dry weight basis)

COMPOUND	L14065-30 (A) LAB FLAG [1]	L14065-30 (A) CONC. FOUND	WG31355-103 LAB FLAG [1]	WG31355-103 CONC. FOUND	MEAN	RELATIVE PERCENT DIFFERENCE
2,3,7,8-TCDD	J	0.138	J	0.171	0.154	21.2
1,2,3,7,8-PECDD	K J	0.205	J	0.260		
1,2,3,4,7,8-HXCDD	J	0.368	J	0.383	0.375	4.17
1,2,3,6,7,8-HXCDD	J	1.14	J	1.21	1.17	5.99
1,2,3,7,8,9-HXCDD	J	1.03	J	1.16	1.09	11.9
1,2,3,4,6,7,8-HPCDD		26.9		23.9	25.4	11.6
OCDD		291		233	262	22.4
2,3,7,8-TCDF	J	0.271	J	0.167	0.219	47.5
1,2,3,7,8-PECDF	J	0.107	K J	0.102		
2,3,4,7,8-PECDF	J	0.215	J	0.215	0.215	0.311
1,2,3,4,7,8-HXCDF	J	0.662	J	0.637	0.650	3.87
1,2,3,6,7,8-HXCDF	J	0.249	J	0.239	0.244	4.01
1,2,3,7,8,9-HXCDF	U		U			
2,3,4,6,7,8-HXCDF	J	0.211	J	0.184	0.197	13.5
1,2,3,4,6,7,8-HPCDF		5.15	J	4.66	4.91	10.1
1,2,3,4,7,8,9-HPCDF	J	0.401	J	0.335	0.368	17.9
OCDF		18.2		16.0	17.1	12.6

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: RPD_DIOXINS_1613-RPD_WG31355-103_L14065-30_.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS537-010
Sample Collection:
17-Dec-2009 10:07

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-31 i3
Matrix:	SOLID	**Sample Size:**	10.8 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	21-Jan-2010 **Time:** 19:11:48	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_009 S: 11**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_009 S: 8
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.250	0.0465	0.68	1.001
1,2,3,7,8-PECDD [3]	J	0.790	0.0465	0.55	1.001
1,2,3,4,7,8-HXCDD	J	1.27	0.0465	1.17	1.000
1,2,3,6,7,8-HXCDD	J	4.93	0.0465	1.20	1.000
1,2,3,7,8,9-HXCDD	J	3.52	0.0465	1.22	1.000
1,2,3,4,6,7,8-HPCDD		111	0.0854	1.02	1.000
OCDD	B	1020	0.0465	0.88	1.000
2,3,7,8-TCDF		1.34	0.0465	0.70	1.002
1,2,3,7,8-PECDF	J	0.339	0.0465	1.69	1.001
2,3,4,7,8-PECDF	J	0.726	0.0465	1.33	1.001
1,2,3,4,7,8-HXCDF	J	2.16	0.0465	1.21	1.001
1,2,3,6,7,8-HXCDF	J	0.849	0.0465	1.21	1.000
1,2,3,7,8,9-HXCDF	J	0.090	0.0465	1.25	1.000
2,3,4,6,7,8-HXCDF	J	0.771	0.0465	1.22	1.000
1,2,3,4,6,7,8-HPCDF		22.2	0.0645	1.02	1.001
1,2,3,4,7,8,9-HPCDF	J	1.41	0.0645	1.06	1.000
OCDF		73.2	0.0465	0.89	1.002
TOTAL TETRA-DIOXINS		2.59	0.0465		
TOTAL PENTA-DIOXINS	J	4.40	0.0465		
TOTAL HEXA-DIOXINS		39.7	0.0465		
TOTAL HEPTA-DIOXINS		293	0.0854		
TOTAL TETRA-FURANS		10.1	0.0465		
TOTAL PENTA-FURANS		12.7	0.0465		
TOTAL HEXA-FURANS		30.9	0.0465		
TOTAL HEPTA-FURANS		65.6	0.0645		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-31_Form1A_DX0M_009S11_SJ1102698.html; Workgroup: WG31355; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS537-010
Sample Collection:
17-Dec-2009 10:07

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-31 i2
Matrix:	SOLID	**Sample Size:**	10.8 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 14:11:01	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_020 S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_020 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.6

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.605	0.0559	0.85	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-31_Form1A_DB0B_020S10_SJ1102734.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS538-010
Sample Collection:
17-Dec-2009 10:20

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-32 i2
Matrix:	SOLID	**Sample Size:**	9.56 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	21-Jan-2010 **Time:** 20:59:08	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_009 S: 13**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_009 S: 8
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	59.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.689	0.0523	0.66	1.002
1,2,3,7,8-PECDD [3]	J	1.91	0.0523	0.59	1.001
1,2,3,4,7,8-HXCDD	J	2.39	0.0534	1.27	1.000
1,2,3,6,7,8-HXCDD		12.1	0.0534	1.24	1.000
1,2,3,7,8,9-HXCDD		9.28	0.0534	1.21	1.000
1,2,3,4,6,7,8-HPCDD		361	0.163	1.04	1.000
OCDD	B	4440	0.0523	0.87	1.000
2,3,7,8-TCDF		6.69	0.0523	0.75	1.002
1,2,3,7,8-PECDF	J	1.56	0.0523	1.60	1.001
2,3,4,7,8-PECDF	J	4.38	0.0523	1.54	1.001
1,2,3,4,7,8-HXCDF		16.6	0.0523	1.25	1.000
1,2,3,6,7,8-HXCDF		5.40	0.0523	1.17	1.000
1,2,3,7,8,9-HXCDF	J	0.301	0.0523	1.33	1.000
2,3,4,6,7,8-HXCDF	J	3.26	0.0523	1.14	1.001
1,2,3,4,6,7,8-HPCDF		67.6	0.0915	0.99	1.000
1,2,3,4,7,8,9-HPCDF		7.87	0.0915	1.01	1.000
OCDF		234	0.0523	0.86	1.002
TOTAL TETRA-DIOXINS		8.31	0.0523		
TOTAL PENTA-DIOXINS		13.4	0.0523		
TOTAL HEXA-DIOXINS		115	0.0534		
TOTAL HEPTA-DIOXINS		976	0.163		
TOTAL TETRA-FURANS		43.2	0.0523		
TOTAL PENTA-FURANS		57.6	0.0523		
TOTAL HEXA-FURANS		113	0.0523		
TOTAL HEPTA-FURANS		219	0.0915		

(1) Where applicable, custom lab flags have been used on this report; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-32_Form1A_DX0M_009S13_SJ1102700.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS538-010
Sample Collection:
17-Dec-2009 10:20

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-32 i2
Matrix:	SOLID	**Sample Size:**	9.56 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 15:58:33	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_020 S: 13**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_020 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	59.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		3.39	0.190	0.83	1.000

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:16:21; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-32_Form1A_DB0B_020S13_SJ1102737.html; Workgroup: WG31355; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS539-010
Sample Collection:
17-Dec-2009 10:37

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-33
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 21:16:42	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 9**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.152	0.0490	0.53	1.001
1,2,3,7,8-PECDD [3]	J	0.270	0.0490	0.57	1.002
1,2,3,4,7,8-HXCDD	J	0.389	0.0490	1.21	1.000
1,2,3,6,7,8-HXCDD	J	1.29	0.0490	1.16	1.000
1,2,3,7,8,9-HXCDD	J	1.12	0.0490	1.17	1.000
1,2,3,4,6,7,8-HPCDD		26.1	0.0490	1.03	1.000
OCDD	B	258	0.0490	0.88	1.000
2,3,7,8-TCDF	J	0.534	0.0490	0.76	1.001
1,2,3,7,8-PECDF	J	0.135	0.0490	1.42	1.001
2,3,4,7,8-PECDF	J	0.246	0.0490	1.64	1.001
1,2,3,4,7,8-HXCDF	J	0.834	0.0490	1.17	1.001
1,2,3,6,7,8-HXCDF	J	0.300	0.0490	1.10	1.000
1,2,3,7,8,9-HXCDF	U		0.0490		
2,3,4,6,7,8-HXCDF	J	0.258	0.0490	1.21	1.001
1,2,3,4,6,7,8-HPCDF		5.44	0.0490	1.01	1.000
1,2,3,4,7,8,9-HPCDF	J	0.393	0.0490	1.08	1.000
OCDF		22.1	0.0490	0.86	1.002
TOTAL TETRA-DIOXINS	J	0.959	0.0490		
TOTAL PENTA-DIOXINS	J	2.02	0.0490		
TOTAL HEXA-DIOXINS		11.2	0.0490		
TOTAL HEPTA-DIOXINS		63.7	0.0490		
TOTAL TETRA-FURANS		3.87	0.0490		
TOTAL PENTA-FURANS	J	3.65	0.0490		
TOTAL HEXA-FURANS		9.27	0.0490		
TOTAL HEPTA-FURANS		18.4	0.0490		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-33_Form1A_DX0M_007S9_SJ1100157.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS539-010
Sample Collection:
17-Dec-2009 10:37

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-33 i2
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 12:23:18	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_020 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_020 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	68.5

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	K J	0.236	0.0490	0.52	1.001

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-33_Form1A_DB0B_020S7_SJ1102731.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS540-010
Sample Collection:
17-Dec-2009 11:05

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-34 i
Matrix:	SOLID	**Sample Size:**	9.73 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 17:27:44	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_008 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_008 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	61.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.605	0.0514	0.66	1.002
1,2,3,7,8-PECDD [3]	J	1.56	0.0514	0.59	1.000
1,2,3,4,7,8-HXCDD	J	1.92	0.0514	1.22	1.000
1,2,3,6,7,8-HXCDD		5.82	0.0514	1.22	1.000
1,2,3,7,8,9-HXCDD		6.91	0.0514	1.23	1.000
1,2,3,4,6,7,8-HPCDD		96.8	0.0606	0.91	1.000
OCDD	B	769	0.0514	0.87	1.000
2,3,7,8-TCDF		3.74	0.0514	0.75	1.001
1,2,3,7,8-PECDF	J	0.712	0.0514	1.59	1.001
2,3,4,7,8-PECDF	J	2.15	0.0514	1.53	1.000
1,2,3,4,7,8-HXCDF	J	4.19	0.0514	1.16	1.000
1,2,3,6,7,8-HXCDF	J	1.55	0.0514	1.17	1.001
1,2,3,7,8,9-HXCDF	K J	0.093	0.0514	0.90	1.000
2,3,4,6,7,8-HXCDF	J	1.35	0.0514	1.13	1.000
1,2,3,4,6,7,8-HPCDF		17.9	0.0514	0.99	1.001
1,2,3,4,7,8,9-HPCDF	J	2.18	0.0514	1.04	1.000
OCDF		56.4	0.0514	0.87	1.002
TOTAL TETRA-DIOXINS		9.34	0.0514		
TOTAL PENTA-DIOXINS		13.4	0.0514		
TOTAL HEXA-DIOXINS		58.9	0.0514		
TOTAL HEPTA-DIOXINS		235	0.0606		
TOTAL TETRA-FURANS		36.0	0.0514		
TOTAL PENTA-FURANS		45.5	0.0514		
TOTAL HEXA-FURANS		41.9	0.0514		
TOTAL HEPTA-FURANS		52.1	0.0514		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-34_Form1A_DX0M_008S8_SJ1102445.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS540-010
Sample Collection:
17-Dec-2009 11:05

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-34 i2
Matrix:	SOLID	**Sample Size:**	9.73 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 15:22:44	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_020 S: 12**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_020 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	61.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF		1.87	0.103	0.82	1.001

(1) Where applicable, custom lab flags have been used on this report.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 29-Jan-2010 09:16:21; Application: XMLTransformer-1.10.15;
Report Filename: 1613_DIOXINS_1613DB225_L14065-34_Form1A_DB0B_020S12_SJ1102736.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS541-010
Sample Collection:
17-Dec-2009 13:39

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-35 R
Matrix:	SOLID	**Sample Size:**	11.3 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	29-Jan-2010 **Time:** 14:59:35	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_012 S: 21**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_012 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_012 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	72.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.126	0.0443	0.66	1.001
1,2,3,7,8-PECDD [3]	J	0.220	0.0443	0.54	1.001
1,2,3,4,7,8-HXCDD	K J	0.354	0.0443	1.62	1.001
1,2,3,6,7,8-HXCDD	J	1.92	0.0443	1.33	1.000
1,2,3,7,8,9-HXCDD	J	1.06	0.0443	1.26	1.000
1,2,3,4,6,7,8-HPCDD	B	50.7	0.0555	1.01	1.000
OCDD	B	496	0.0443	0.87	1.000
2,3,7,8-TCDF	J	0.457	0.0443	0.71	1.002
1,2,3,7,8-PECDF	J	0.119	0.0443	1.43	1.001
2,3,4,7,8-PECDF	J	0.287	0.0443	1.66	1.001
1,2,3,4,7,8-HXCDF		5.57	0.0443	1.21	1.001
1,2,3,6,7,8-HXCDF	J	0.906	0.0443	1.28	1.000
1,2,3,7,8,9-HXCDF	J	0.063	0.0443	1.39	1.001
2,3,4,6,7,8-HXCDF	J	0.391	0.0443	1.33	1.000
1,2,3,4,6,7,8-HPCDF		35.1	0.0610	1.02	1.000
1,2,3,4,7,8,9-HPCDF	J	3.06	0.0610	0.95	1.000
OCDF		70.3	0.0443	0.85	1.002
TOTAL TETRA-DIOXINS		1.04	0.0443		
TOTAL PENTA-DIOXINS		1.21	0.0443		
TOTAL HEXA-DIOXINS		10.9	0.0443		
TOTAL HEPTA-DIOXINS	B	105	0.0555		
TOTAL TETRA-FURANS		2.83	0.0443		
TOTAL PENTA-FURANS		4.30	0.0443		
TOTAL HEXA-FURANS		34.5	0.0443		
TOTAL HEPTA-FURANS		112	0.0610		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-35_Form1A_DX0M_012S21_SJ1106148.html; Workgroup: WG31593; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS542-010
Sample Collection:
17-Dec-2009 13:26

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-36 i
Matrix:	SOLID	**Sample Size:**	9.89 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 15:37:56	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_008 S: 6**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_008 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	64.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.351	0.0506	0.74	1.001
1,2,3,7,8-PECDD [3]	J	0.568	0.0506	0.54	1.001
1,2,3,4,7,8-HXCDD	J	0.641	0.0506	1.35	1.000
1,2,3,6,7,8-HXCDD	J	2.11	0.0506	1.27	1.000
1,2,3,7,8,9-HXCDD	J	1.96	0.0506	1.26	1.000
1,2,3,4,6,7,8-HPCDD		39.5	0.0517	1.00	1.000
OCDD	B	367	0.0506	0.88	1.000
2,3,7,8-TCDF	J	0.863	0.0506	0.76	1.002
1,2,3,7,8-PECDF	J	0.238	0.0506	1.68	1.001
2,3,4,7,8-PECDF	J	0.424	0.0506	1.49	1.000
1,2,3,4,7,8-HXCDF	J	1.13	0.0506	1.10	1.000
1,2,3,6,7,8-HXCDF	J	0.500	0.0506	1.06	1.000
1,2,3,7,8,9-HXCDF	K J	0.063	0.0506	1.03	1.000
2,3,4,6,7,8-HXCDF	J	0.387	0.0506	1.17	1.000
1,2,3,4,6,7,8-HPCDF		8.27	0.0506	1.02	1.000
1,2,3,4,7,8,9-HPCDF	J	0.577	0.0506	0.90	1.000
OCDF		27.3	0.0506	0.87	1.002
TOTAL TETRA-DIOXINS		2.14	0.0506		
TOTAL PENTA-DIOXINS	J	3.79	0.0506		
TOTAL HEXA-DIOXINS		18.3	0.0506		
TOTAL HEPTA-DIOXINS		93.6	0.0517		
TOTAL TETRA-FURANS		6.85	0.0506		
TOTAL PENTA-FURANS		8.26	0.0506		
TOTAL HEXA-FURANS		13.8	0.0506		
TOTAL HEPTA-FURANS		25.3	0.0506		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-36_Form1A_DX0M_008S6_SJ1102443.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS542-010
Sample Collection:
17-Dec-2009 13:26

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-36 i2
Matrix:	SOLID	**Sample Size:**	9.89 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 12:59:11	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_020 S: 8**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_020 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	64.1

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	K J	0.423	0.0673	0.99	1.001

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-36_Form1A_DB0B_020S8_SJ1102732.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS543-010
Sample Collection:
17-Dec-2009 13:07

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-37
Matrix:	SOLID	**Sample Size:**	12.8 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	15-Jan-2010 **Time:** 22:11:39	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_007 S: 10**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_007 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.205	0.0391	0.64	1.001
1,2,3,7,8-PECDD [3]	J	0.479	0.0391	0.53	1.001
1,2,3,4,7,8-HXCDD	J	0.738	0.0391	1.36	1.000
1,2,3,6,7,8-HXCDD	J	2.20	0.0391	1.23	1.000
1,2,3,7,8,9-HXCDD	J	2.20	0.0391	1.19	1.000
1,2,3,4,6,7,8-HPCDD		42.8	0.0438	1.02	1.000
OCDD	B	373	0.0391	0.87	1.000
2,3,7,8-TCDF	J	0.680	0.0391	0.78	1.001
1,2,3,7,8-PECDF	J	0.181	0.0391	1.35	1.001
2,3,4,7,8-PECDF	J	0.328	0.0391	1.49	1.001
1,2,3,4,7,8-HXCDF	J	1.01	0.0391	1.16	1.000
1,2,3,6,7,8-HXCDF	J	0.424	0.0391	1.05	1.001
1,2,3,7,8,9-HXCDF	J	0.044	0.0391	1.38	1.001
2,3,4,6,7,8-HXCDF	J	0.358	0.0391	1.23	1.001
1,2,3,4,6,7,8-HPCDF		8.78	0.0391	1.00	1.000
1,2,3,4,7,8,9-HPCDF	J	0.609	0.0391	1.03	1.000
OCDF		32.5	0.0391	0.85	1.002
TOTAL TETRA-DIOXINS		1.76	0.0391		
TOTAL PENTA-DIOXINS	J	3.35	0.0391		
TOTAL HEXA-DIOXINS		19.0	0.0391		
TOTAL HEPTA-DIOXINS		105	0.0438		
TOTAL TETRA-FURANS		5.70	0.0391		
TOTAL PENTA-FURANS		6.18	0.0391		
TOTAL HEXA-FURANS		15.1	0.0391		
TOTAL HEPTA-FURANS		28.7	0.0391		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-37_Form1A_DX0M_007S10_SJ1100141.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS543-010
Sample Collection:
17-Dec-2009 13:07

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-37 i2
Matrix:	SOLID	**Sample Size:**	12.8 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 13:35:03	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_020 S: 9**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_020 S: 3
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	57.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.370	0.0391	0.87	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-37_Form1A_DB0B_020S9_SJ1102733.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS544-010-COMP
Sample Collection:
12-Jan-2010 18:29

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-6
Matrix:	SOLID	**Sample Size:**	10.5 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	12-Feb-2010 **Time:** 00:50:36	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 15**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	62.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD		0.606	0.0478	0.66	1.001
1,2,3,7,8-PECDD [3]	J	0.690	0.0478	0.52	1.001
1,2,3,4,7,8-HXCDD	J	0.911	0.0478	1.16	1.000
1,2,3,6,7,8-HXCDD		2.87	0.0478	1.21	1.000
1,2,3,7,8,9-HXCDD		2.73	0.0478	1.27	1.000
1,2,3,4,6,7,8-HPCDD		60.1	0.0859	1.01	1.000
OCDD	B	548	0.0478	0.87	1.000
2,3,7,8-TCDF		2.49	0.0478	0.80	1.001
1,2,3,7,8-PECDF	K J	0.414	0.0478	1.18	1.001
2,3,4,7,8-PECDF		0.948	0.0478	1.51	1.001
1,2,3,4,7,8-HXCDF		2.60	0.0478	1.19	1.000
1,2,3,6,7,8-HXCDF		1.16	0.0478	1.21	1.001
1,2,3,7,8,9-HXCDF	K J	0.102	0.0478	1.94	1.000
2,3,4,6,7,8-HXCDF	J	0.843	0.0478	1.13	1.001
1,2,3,4,6,7,8-HPCDF		14.0	0.0478	0.98	1.000
1,2,3,4,7,8,9-HPCDF		1.15	0.0478	0.97	1.000
OCDF	B	46.0	0.0478	0.86	1.002
TOTAL TETRA-DIOXINS		4.78	0.0478		
TOTAL PENTA-DIOXINS		5.70	0.0478		
TOTAL HEXA-DIOXINS		26.7	0.0478		
TOTAL HEPTA-DIOXINS		134	0.0859		
TOTAL TETRA-FURANS		19.4	0.0478		
TOTAL PENTA-FURANS		18.1	0.0478		
TOTAL HEXA-FURANS		27.1	0.0478		
TOTAL HEPTA-FURANS		46.0	0.0478		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14159-6_Form1A_DX0M_019S15_SJ1112917.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS544-010-COMP
Sample Collection:
12-Jan-2010 18:29

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-6
Matrix:	SOLID	**Sample Size:**	10.5 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 15:49:07	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 11**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	62.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.927	0.154	0.86	1.002

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14159-6_Form1A_DB0B_039S11_SJ1111279.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS545-010
Sample Collection:
17-Dec-2009 12:52

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-38 Li
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	21-Jan-2010 **Time:** 12:26:20	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_009 S: 4**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_009 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	79.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	J	0.061	0.0490	0.66	1.001
1,2,3,7,8-PECDD [3]	J	0.070	0.0490	0.59	1.001
1,2,3,4,7,8-HXCDD	J	0.123	0.0490	1.36	1.000
1,2,3,6,7,8-HXCDD	J	0.197	0.0490	1.07	1.000
1,2,3,7,8,9-HXCDD	J	0.198	0.0490	1.40	1.000
1,2,3,4,6,7,8-HPCDD	J	2.77	0.0490	1.00	1.000
OCDD	B	21.5	0.0684	0.88	1.000
2,3,7,8-TCDF	K J	0.087	0.0490	0.60	1.002
1,2,3,7,8-PECDF	U		0.0490		
2,3,4,7,8-PECDF	K J	0.059	0.0490	2.45	1.001
1,2,3,4,7,8-HXCDF	J	0.129	0.0490	1.18	1.000
1,2,3,6,7,8-HXCDF	J	0.061	0.0490	1.15	1.001
1,2,3,7,8,9-HXCDF	J	0.076	0.0490	1.26	1.000
2,3,4,6,7,8-HXCDF	J	0.074	0.0490	1.07	1.001
1,2,3,4,6,7,8-HPCDF	J	0.750	0.0490	0.94	1.000
1,2,3,4,7,8,9-HPCDF	J	0.120	0.0490	1.17	1.001
OCDF	J	2.04	0.0490	0.84	1.002
TOTAL TETRA-DIOXINS	J	0.122	0.0490		
TOTAL PENTA-DIOXINS	J	0.070	0.0490		
TOTAL HEXA-DIOXINS	J	1.55	0.0490		
TOTAL HEPTA-DIOXINS		6.44	0.0490		
TOTAL TETRA-FURANS	J	0.337	0.0490		
TOTAL PENTA-FURANS	J	0.064	0.0490		
TOTAL HEXA-FURANS	J	1.35	0.0490		
TOTAL HEPTA-FURANS	J	2.08	0.0490		

(1) Where applicable, custom lab flags have been used on this report; U = not detected; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-38_Form1A_DX0M_009S4_SJ1102808.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS545-010
Sample Collection:
17-Dec-2009 12:52

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-38 L
Matrix:	SOLID	**Sample Size:**	10.2 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 23:05:49	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_021 S: 5**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_015 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_021 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	79.9

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	K J	0.074	0.0490	0.29	1.001

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB225_L14065-38_Form1A_DB0B_021S5_SJ1102744.html; Workgroup: WG31355; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS546-010
Sample Collection:
17-Dec-2009 12:10

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14065-39 i
Matrix:	SOLID	**Sample Size:**	9.68 g (dry)
Sample Receipt Date:	22-Dec-2009	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	04-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	20-Jan-2010 **Time:** 16:32:34	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_008 S: 7**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_007 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_008 S: 1
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	61.2

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K J	0.276	0.0517	0.63	1.001
1,2,3,7,8-PECDD [3]	J	0.546	0.0517	0.62	1.001
1,2,3,4,7,8-HXCDD	J	0.948	0.0517	1.19	1.000
1,2,3,6,7,8-HXCDD	J	2.77	0.0517	1.22	1.000
1,2,3,7,8,9-HXCDD	J	2.55	0.0517	1.20	1.000
1,2,3,4,6,7,8-HPCDD		52.3	0.0566	1.01	1.000
OCDD	B	469	0.0517	0.87	1.000
2,3,7,8-TCDF	J	1.09	0.0517	0.76	1.002
1,2,3,7,8-PECDF	J	0.238	0.0517	1.34	1.000
2,3,4,7,8-PECDF	J	0.461	0.0517	1.51	1.000
1,2,3,4,7,8-HXCDF	J	0.963	0.0517	1.23	1.001
1,2,3,6,7,8-HXCDF	J	0.532	0.0517	1.06	1.000
1,2,3,7,8,9-HXCDF	J	0.058	0.0517	1.15	1.001
2,3,4,6,7,8-HXCDF	J	0.463	0.0517	1.15	1.000
1,2,3,4,6,7,8-HPCDF		10.2	0.0517	1.02	1.000
1,2,3,4,7,8,9-HPCDF	J	0.650	0.0517	1.09	1.000
OCDF		34.2	0.0517	0.85	1.002
TOTAL TETRA-DIOXINS		2.37	0.0517		
TOTAL PENTA-DIOXINS	J	3.95	0.0517		
TOTAL HEXA-DIOXINS		22.5	0.0517		
TOTAL HEPTA-DIOXINS		122	0.0566		
TOTAL TETRA-FURANS		7.37	0.0517		
TOTAL PENTA-FURANS		7.20	0.0517		
TOTAL HEXA-FURANS		16.2	0.0517		
TOTAL HEPTA-FURANS		30.2	0.0517		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Teresa Rawsthorne_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14065-39_Form1A_DX0M_008S7_SJ1102444.html; Workgroup: WG31355; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS547-010
Sample Collection:
11-Jan-2010 09:20

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-7
Matrix:	SOLID	**Sample Size:**	10.8 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	19-Nov-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	12-Feb-2010 **Time:** 01:44:29	**GC Column ID:**	DB5
Extract Volume (uL):	20	**Sample Data Filename:**	**DX0M_019 S: 16**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DX0M_019 S: 6
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DX0M_019 S: 12
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	55.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDD	K	0.299	0.0463	0.57	1.001
1,2,3,7,8-PECDD [3]	J	0.942	0.0463	0.62	1.001
1,2,3,4,7,8-HXCDD		1.21	0.0463	1.11	1.000
1,2,3,6,7,8-HXCDD		3.61	0.0463	1.21	1.000
1,2,3,7,8,9-HXCDD		3.81	0.0463	1.20	1.000
1,2,3,4,6,7,8-HPCDD		76.5	0.0822	1.02	1.000
OCDD	B	754	0.0463	0.88	1.000
2,3,7,8-TCDF		1.64	0.0463	0.74	1.002
1,2,3,7,8-PECDF	J	0.350	0.0463	1.43	1.001
2,3,4,7,8-PECDF	J	0.795	0.0463	1.43	1.001
1,2,3,4,7,8-HXCDF		1.64	0.0463	1.11	1.000
1,2,3,6,7,8-HXCDF		0.897	0.0463	1.14	1.000
1,2,3,7,8,9-HXCDF	J	0.071	0.0463	1.11	1.000
2,3,4,6,7,8-HXCDF	J	0.843	0.0463	1.15	1.000
1,2,3,4,6,7,8-HPCDF		14.0	0.0463	1.01	1.000
1,2,3,4,7,8,9-HPCDF		0.931	0.0463	0.94	1.000
OCDF	B	53.7	0.0584	0.85	1.002
TOTAL TETRA-DIOXINS		5.48	0.0463		
TOTAL PENTA-DIOXINS		7.69	0.0463		
TOTAL HEXA-DIOXINS		34.2	0.0463		
TOTAL HEPTA-DIOXINS		175	0.0822		
TOTAL TETRA-FURANS		16.1	0.0463		
TOTAL PENTA-FURANS		24.5	0.0463		
TOTAL HEXA-FURANS		28.2	0.0463		
TOTAL HEPTA-FURANS		50.1	0.0463		

(1) Where applicable, custom lab flags have been used on this report; K = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration; B = analyte found in sample and the associated blank; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.
(3) Alternate confirmation and quantitation ions used for native and labeled PECDD.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

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Report Filename: 1613_DIOXINS_1613DB5_L14159-7_Form1A_DX0M_019S16_SJ1112918.html; Workgroup: WG31619; Design ID: 491]

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AXYS METHOD MLA-017 Rev 17

CLIENT SAMPLE NO.
LDW-SS547-010
Sample Collection:
11-Jan-2010 09:20

Form 1A

PCDD/PCDF ANALYSIS REPORT

AXYS ANALYTICAL SERVICES
2045 MILLS RD., SIDNEY, B.C., CANADA
V8L 5X2 TEL (250) 655-5800 FAX (250) 655-5811

		Project No.	LDW DIOXIN AND FURAN SAMPLING
Contract No.:	4033	**Lab Sample I.D.:**	L14159-7
Matrix:	SOLID	**Sample Size:**	10.8 g (dry)
Sample Receipt Date:	20-Jan-2010	**Initial Calibration Date:**	23-Dec-2009
Extraction Date:	25-Jan-2010	**Instrument ID:**	HR GC/MS
Analysis Date:	11-Feb-2010 **Time:** 16:24:56	**GC Column ID:**	DB225
Extract Volume (uL):	20	**Sample Data Filename:**	**DB0B_039 S: 12**
Injection Volume (uL):	1.0	**Blank Data Filename:**	DB0B_039 S: 5
Dilution Factor:	N/A	**Cal. Ver. Data Filename:**	DB0B_039 S: 2
Concentration Units:	ng/kg (dry weight basis)	**% Solids:**	55.4

COMPOUND	LAB FLAG [1]	CONCENTRATION FOUND	DETECTION LIMIT	ION ABUND. RATIO [2]	RRT [2]
2,3,7,8-TCDF	J	0.859	0.0966	0.69	1.001

(1) Where applicable, custom lab flags have been used on this report; J = concentration less than LMCL.
(2) Contract-required limits for RRTs and ion abundance ratios are specified in Tables 2 and 9, respectively, Method 1613.

Approved by: _____Shelley Facchin_____ QA/QC Chemist

For Axys Internal Use Only [XSL Template: Form1A.xsl; Created: 23-Feb-2010 14:53:00; Application: XMLTransformer-1.10.17;
Report Filename: 1613_DIOXINS_1613DB225_L14159-7_Form1A_DB0B_039S12_SJ1111280.html; Workgroup: WG31619; Design ID: 491]

These pages are part of a larger report that may contain information necessary for full data evaluation. Results reported relate only to the sample tested. Results are compliant with NELAP where specific accreditation is held.

PCBs

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS502-010-comp
SAMPLE

Lab Sample ID: QG62A
LIMS ID: 10-1447
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 19:13
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 30.2%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	20	< 20 U
53469-21-9	Aroclor 1242	20	< 20 U
12672-29-6	Aroclor 1248	20	< 20 U
11097-69-1	**Aroclor 1254**	**20**	**60**
11096-82-5	**Aroclor 1260**	**20**	**26**
11104-28-2	Aroclor 1221	20	< 20 U
11141-16-5	Aroclor 1232	20	< 20 U
37324-23-5	Aroclor 1262	20	< 20 U
11100-14-4	Aroclor 1268	20	< 20 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	74.9%
Tetrachlorometaxylene	72.6%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS503-043-comp
SAMPLE

Lab Sample ID: QG62D
LIMS ID: 10-1450
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 13:56
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 26.1 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 24.4%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	3.8	< 3.8 U
11097-69-1	**Aroclor 1254**	**3.8**	**16**
11096-82-5	**Aroclor 1260**	**3.8**	**10**
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U
37324-23-5	Aroclor 1262	3.8	< 3.8 U
11100-14-4	Aroclor 1268	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	94.2%
Tetrachlorometaxylene	69.2%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS508-010
SAMPLE

Lab Sample ID: QG62E
LIMS ID: 10-1451
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 02/01/10 10:28
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: Yes

Percent Moisture: 58.4%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	0.8	< 0.8 U
53469-21-9	Aroclor 1242	0.8	< 0.8 U
12672-29-6	Aroclor 1248	0.8	< 0.8 U
11097-69-1	Aroclor 1254	0.8	< 0.8 U
11096-82-5	Aroclor 1260	0.8	< 0.8 U
11104-28-2	Aroclor 1221	0.8	< 0.8 U
11141-16-5	Aroclor 1232	0.8	< 0.8 U
37324-23-5	Aroclor 1262	0.8	< 0.8 U
11100-14-4	Aroclor 1268	0.8	< 0.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	62.0%
Tetrachlorometaxylene	61.5%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS509-010
SAMPLE

Lab Sample ID: QG62F
LIMS ID: 10-1452
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 19:37
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 10.5 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 58.2%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	48	< 48 U
53469-21-9	Aroclor 1242	48	< 48 U
12672-29-6	Aroclor 1248	190	< 190 Y
11097-69-1	**Aroclor 1254**	**48**	**410**
11096-82-5	**Aroclor 1260**	**48**	**150**
11104-28-2	Aroclor 1221	48	< 48 U
11141-16-5	Aroclor 1232	48	< 48 U
37324-23-5	Aroclor 1262	48	< 48 U
11100-14-4	Aroclor 1268	48	< 48 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	121%
Tetrachlorometaxylene	74.6%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS523-010
SAMPLE

Lab Sample ID: QG62G
LIMS ID: 10-1453
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 20:00
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 21.6%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	20	< 20 U
53469-21-9	Aroclor 1242	20	< 20 U
12672-29-6	Aroclor 1248	20	< 20 U
11097-69-1	**Aroclor 1254**	**20**	**34**
11096-82-5	**Aroclor 1260**	**20**	**32**
11104-28-2	Aroclor 1221	20	< 20 U
11141-16-5	Aroclor 1232	20	< 20 U
37324-23-5	Aroclor 1262	20	< 20 U
11100-14-4	Aroclor 1268	20	< 20 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	78.6%
Tetrachlorometaxylene	74.5%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS525-010
SAMPLE

Lab Sample ID: QG62H
LIMS ID: 10-1454
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/16/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 15:24
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.9 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 22.2%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**4.8**
11097-69-1	**Aroclor 1254**	**3.9**	**8.3**
11096-82-5	**Aroclor 1260**	**3.9**	**6.5**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U
37324-23-5	Aroclor 1262	3.9	< 3.9 U
11100-14-4	Aroclor 1268	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	75.1%
Tetrachlorometaxylene	67.8%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS526-010
SAMPLE

Lab Sample ID: QG62I
LIMS ID: 10-1455
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/16/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 21:11
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 32.0%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	20	< 20 U
53469-21-9	Aroclor 1242	20	< 20 U
12672-29-6	Aroclor 1248	99	< 99 Y
11097-69-1	**Aroclor 1254**	**20**	**260**
11096-82-5	**Aroclor 1260**	**20**	**100**
11104-28-2	Aroclor 1221	20	< 20 U
11141-16-5	Aroclor 1232	20	< 20 U
37324-23-5	Aroclor 1262	20	< 20 U
11100-14-4	Aroclor 1268	20	< 20 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	107%
Tetrachlorometaxylene	78.1%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS527-010
SAMPLE

Lab Sample ID: QG62B
LIMS ID: 10-1448
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/17/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 13:13
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.2 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 52.8%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	**Aroclor 1248**	**4.0**	**23**
11097-69-1	**Aroclor 1254**	**4.0**	**37**
11096-82-5	**Aroclor 1260**	**4.0**	**31**
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U
37324-23-5	Aroclor 1262	4.0	< 4.0 U
11100-14-4	Aroclor 1268	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	71.4%
Tetrachlorometaxylene	68.0%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS603-010
SAMPLE

Lab Sample ID: QG62C
LIMS ID: 10-1449
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/17/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 13:35
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 54.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	**Aroclor 1248**	**4.0**	**23**
11097-69-1	**Aroclor 1254**	**4.0**	**35**
11096-82-5	**Aroclor 1260**	**4.0**	**20**
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U
37324-23-5	Aroclor 1262	4.0	< 4.0 U
11100-14-4	Aroclor 1268	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	66.0%
Tetrachlorometaxylene	73.1%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS529-041-comp
SAMPLE

Lab Sample ID: QG62J
LIMS ID: 10-1456
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 21:35
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 25.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	19	< 19 U
53469-21-9	Aroclor 1242	19	< 19 U
12672-29-6	Aroclor 1248	290	< 290 Y
11097-69-1	**Aroclor 1254**	**19**	**860**
11096-82-5	Aroclor 1260	150	< 150 Y
11104-28-2	Aroclor 1221	19	< 19 U
11141-16-5	Aroclor 1232	19	< 19 U
37324-23-5	Aroclor 1262	19	< 19 U
11100-14-4	Aroclor 1268	19	< 19 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	85.5%
Tetrachlorometaxylene	75.9%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS530-010
SAMPLE

Lab Sample ID: QG62K
LIMS ID: 10-1457
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 12/15/09
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 21:59
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 16.1 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 36.4%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	31	< 31 U
53469-21-9	Aroclor 1242	31	< 31 U
12672-29-6	**Aroclor 1248**	**31**	**320**
11097-69-1	**Aroclor 1254**	**31**	**390**
11096-82-5	**Aroclor 1260**	**31**	**150**
11104-28-2	Aroclor 1221	31	< 31 U
11141-16-5	Aroclor 1232	31	< 31 U
37324-23-5	Aroclor 1262	31	< 31 U
11100-14-4	Aroclor 1268	31	< 31 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	91.9%
Tetrachlorometaxylene	74.6%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS531-010-comp
SAMPLE

Lab Sample ID: QG62L
LIMS ID: 10-1469
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/12/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 16:29
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.7 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 27.4%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	4.9	< 4.9 Y
11097-69-1	**Aroclor 1254**	**3.9**	**11**
11096-82-5	**Aroclor 1260**	**3.9**	**10**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U
37324-23-5	Aroclor 1262	3.9	< 3.9 U
11100-14-4	Aroclor 1268	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	84.9%
Tetrachlorometaxylene	69.8%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS533-043-comp
SAMPLE

Lab Sample ID: QG62M
LIMS ID: 10-1470
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/12/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 22:22
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.7 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 28.8%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	20	< 20 U
53469-21-9	Aroclor 1242	20	< 20 U
12672-29-6	**Aroclor 1248**	**20**	**75**
11097-69-1	**Aroclor 1254**	**20**	**140**
11096-82-5	**Aroclor 1260**	**20**	**64**
11104-28-2	Aroclor 1221	20	< 20 U
11141-16-5	Aroclor 1232	20	< 20 U
37324-23-5	Aroclor 1262	20	< 20 U
11100-14-4	Aroclor 1268	20	< 20 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	84.9%
Tetrachlorometaxylene	74.4%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS544-010-comp
SAMPLE

Lab Sample ID: QG62N
LIMS ID: 10-1471
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/12/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 16:51
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.7 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 39.3%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**31**
11097-69-1	**Aroclor 1254**	**3.9**	**55**
11096-82-5	**Aroclor 1260**	**3.9**	**41**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U
37324-23-5	Aroclor 1262	3.9	< 3.9 U
11100-14-4	Aroclor 1268	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	81.6%
Tetrachlorometaxylene	69.0%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LDW-SS547-010
SAMPLE

Lab Sample ID: QG62O
LIMS ID: 10-1472
Matrix: Sediment
Data Release Authorized:
Reported: 02/01/10

QC Report No: QG62-Windward Environmental, LLC
Project: LDW Dioxin Sampling

Date Sampled: 01/11/10
Date Received: 01/18/10

Date Extracted: 01/26/10
Date Analyzed: 01/29/10 17:13
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: Yes

Percent Moisture: 48.0%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	12	< 12 Y
11097-69-1	**Aroclor 1254**	**3.9**	**18**
11096-82-5	**Aroclor 1260**	**3.9**	**12**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U
37324-23-5	Aroclor 1262	3.9	< 3.9 U
11100-14-4	Aroclor 1268	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	91.1%
Tetrachlorometaxylene	76.5%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082

Sample ID: LDW-SS527-RB
SAMPLE

Lab Sample ID: QC19H
LIMS ID: 09-31229
Matrix: Water
Data Release Authorized:
Reported: 12/29/09

QC Report No: QC19-Windward Environmental, LLC
Project: LDW Dioxin Sampling
04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Date Extracted: 12/22/09
Date Analyzed: 12/24/09 00:47
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: No

Sample Amount: 500 mL
Final Extract Volume: 5.0 mL
Dilution Factor: 1.00
Silica Gel: No
Acid Cleanup: No

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	1.0	< 1.0 U
53469-21-9	Aroclor 1242	1.0	< 1.0 U
12672-29-6	Aroclor 1248	1.0	< 1.0 U
11097-69-1	Aroclor 1254	1.0	< 1.0 U
11096-82-5	Aroclor 1260	1.0	< 1.0 U
11104-28-2	Aroclor 1221	1.0	< 1.0 U
11141-16-5	Aroclor 1232	1.0	< 1.0 U
37324-23-5	Aroclor 1262	1.0	< 1.0 U
11100-14-4	Aroclor 1268	1.0	< 1.0 U

Reported in μg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	48.2%
Tetrachlorometaxylene	64.8%

FORM I

GRAIN SIZE

Windward Environmental, LLC
04-08-06-29
LDW Dioxin Sampling

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10	<4
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
LDW-SS504-010	1.6	2.2	11.0	27.2	15.9	3.5	4.1	6.2	7.4	6.6	4.0	3.9	6.4	38.6
	0.5	1.8	11.0	27.5	16.2	3.7	4.5	6.7	7.3	6.5	4.2	3.7	6.3	39.2
	1.8	2.0	10.6	27.1	16.2	3.6	4.3	6.1	7.6	6.3	4.3	3.8	6.4	38.8
LDW-SS508-010	1.1	7.2	2.1	2.0	2.1	1.3	3.5	16.6	21.6	13.9	9.7	8.8	10.3	84.3
LDW-SS523-010	6.8	5.1	17.3	29.4	17.5	10.2	5.3	1.8	1.7	1.4	1.3	1.1	1.3	13.8
LDW-SS601-010	8.7	5.6	17.3	28.9	17.2	9.9	3.9	1.8	1.7	1.5	1.2	1.0	1.1	12.3
LDW-SS530-010	1.7	3.3	9.2	17.8	12.4	14.0	10.8	9.2	7.2	4.9	3.4	2.8	3.3	41.6
LDW-SS509-010	7.3	3.6	8.5	19.3	12.4	10.6	8.6	6.9	5.5	5.6	3.7	3.0	5.0	38.2
LDW-SS501-010	34.3	1.9	3.4	12.0	6.4	3.0	3.8	6.3	7.4	3.6	7.8	4.1	5.9	38.8
LDW-SS505-010	1.0	1.2	2.2	6.7	11.9	9.6	9.6	11.3	12.8	10.6	7.0	6.1	10.0	67.3
LDW-SS506-010	0.0	0.3	0.6	2.0	10.9	13.9	10.2	11.4	13.3	11.4	7.9	6.7	11.4	72.4
LDW-SS507-010	0.4	0.6	1.1	1.5	3.2	6.1	10.5	12.8	16.3	14.8	10.4	8.4	13.8	87.1
LDW-SS510-010	0.1	0.7	1.1	1.7	2.4	8.0	14.0	13.7	15.9	14.6	9.0	7.3	11.5	86.0
LDW-SS512-010	3.8	2.6	12.9	27.6	12.2	4.5	4.5	5.4	7.3	5.9	4.3	3.4	5.7	36.4

Notes to the Testing:
1. Organic matter was not removed prior to testing, thus the reported values are the "apparent" grain size distribution. See narrative for discussion of the testing.

QB98

QB98 : 00052

Windward Environmental, LLC
LDW Dioxin Sampling
04-08-06-29

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10	<4
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
LDW-SS511-010	0.0	0.1	0.3	0.4	0.4	1.0	7.5	17.0	19.2	16.6	12.5	9.0	15.9	97.7
	0.0	0.1	0.1	0.2	0.2	0.9	5.6	16.9	20.4	17.6	13.0	8.6	16.4	98.5
	0.0	0.1	0.1	0.2	0.2	0.8	6.0	16.7	20.1	18.1	12.6	9.0	16.2	98.6
LDW-SS513-010	1.1	1.0	2.2	3.8	2.5	2.3	6.2	14.6	18.7	15.4	10.7	7.7	13.9	87.2
LDW-SS524-010	0.0	0.2	0.3	0.4	1.4	7.0	13.8	20.2	18.5	14.0	8.6	5.2	10.1	90.5
LDW-SS527-010	1.1	0.3	0.9	1.3	2.3	8.9	18.2	23.2	18.7	11.6	5.0	2.6	6.1	85.3
LDW-SS532-010	1.8	2.1	2.9	7.9	12.9	25.8	20.3	9.4	5.8	3.8	2.7	1.4	3.2	46.6
LDW-SS534-010	1.7	2.3	12.6	36.1	10.3	7.0	7.7	7.0	5.4	3.5	2.0	1.5	3.0	30.1
LDW-SS535-010	42.3	6.5	7.9	21.8	12.1	2.9	0.5	2.1	0.5	0.9	0.8	0.4	1.1	6.4
LDW-SS536-010	0.0	0.0	0.4	2.2	65.7	13.8	4.7	4.3	3.3	1.9	0.8	0.7	2.0	17.8
LDW-SS537-010	0.0	0.8	7.1	16.6	13.2	11.5	7.7	12.1	12.3	7.6	3.7	2.3	5.0	50.8
LDW-SS538-010	0.5	1.7	5.9	15.4	12.4	10.5	15.1	11.8	9.9	5.7	3.4	2.5	5.2	53.5
LDW-SS539-010	0.2	0.6	8.2	28.3	24.7	8.7	10.8	6.0	4.3	2.7	1.7	1.1	2.7	29.4
LDW-SS540-010	4.1	3.9	7.9	11.2	10.0	16.4	15.0	10.2	6.9	5.4	2.8	2.4	3.8	46.5

Notes to the Testing:
1. Organic matter was not removed prior to testing, thus the reported values are the "apparent" grain size distribution. See narrative for discussion of the testing.

QC15

QB98:00055

Windward Environmental, LLC
LDW Dioxin Sampling
04-08-06-29

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10	<4
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
LDW-SS602-010	0.0	1.5	1.9	2.5	3.8	6.2	8.3	13.7	16.7	14.4	10.9	7.5	12.6	84.1
	0.0	3.3	2.6	3.6	3.8	6.3	6.2	13.5	16.2	14.2	9.1	9.0	12.2	80.4
	0.1	2.6	2.2	2.4	3.9	6.6	7.3	13.1	16.0	14.8	11.1	7.0	13.0	82.3
LDW-SS514-010	0.2	1.1	5.9	10.7	15.4	11.1	7.1	11.4	11.5	10.9	4.7	4.1	5.9	55.6
LDW-SS515-010	23.6	2.7	2.5	7.1	10.5	5.8	10.3	7.8	9.4	6.1	4.7	3.2	6.4	47.8
LDW-SS516-010	1.8	2.9	6.5	7.2	2.5	6.0	8.7	15.2	16.1	11.8	7.4	4.8	9.0	73.0
LDW-SS517-010	9.0	6.3	4.9	3.9	3.1	6.0	9.7	13.2	13.5	10.1	7.1	4.6	8.5	66.7
LDW-SS518-010	0.1	1.4	0.6	0.4	2.0	13.6	10.8	17.7	15.1	13.6	9.7	5.3	9.7	81.9
LDW-SS519-010	0.0	2.0	1.7	1.6	2.1	8.6	10.8	17.6	16.5	13.3	9.3	5.6	11.0	84.0
LDW-SS521-010	0.0	0.0	1.1	1.6	4.0	17.3	14.2	13.7	13.9	12.6	7.7	4.7	9.1	76.0
LDW-SS522-010	0.0	0.2	0.4	0.7	0.7	1.3	6.6	18.5	27.9	18.3	10.3	5.3	9.6	96.5
LDW-SS525-010	0.9	0.5	19.3	57.6	8.6	5.3	2.3	1.3	1.1	0.9	0.6	0.4	1.2	7.8
LDW-SS526-010	2.9	3.8	24.6	29.7	15.9	6.1	3.4	3.0	3.1	2.8	1.9	1.0	1.6	16.9
LDW-SS528-010	0.6	0.8	1.1	0.7	1.0	2.5	8.5	31.7	27.5	9.3	5.0	3.4	7.9	93.3

Notes to the Testing:
1. Organic matter was not removed prior to testing, thus the reported values are the "apparent" grain size distribution. See narrative for discussion of the testing.

QB99

QB99 : 00033

Windward Environmental, LLC
04-08-06-29
LDW Dioxin Sampling

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10	<4
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
LDW-SS511-010	0.0	0.1	0.3	0.4	0.4	1.0	7.5	17.0	19.2	16.6	12.5	9.0	15.9	97.7
	0.0	0.1	0.1	0.2	0.2	0.9	5.6	16.9	20.4	17.6	13.0	8.6	16.4	98.5
	0.0	0.1	0.1	0.2	0.2	0.8	6.0	16.7	20.1	18.1	12.6	9.0	16.2	98.6
LDW-SS541-010	0.1	0.3	1.4	19.4	48.5	9.0	7.1	4.0	3.3	2.4	1.1	1.0	2.5	21.3
LDW-SS542-010	0.3	0.6	1.9	11.9	19.4	21.8	16.9	9.3	6.7	4.2	2.3	1.8	2.8	44.1
LDW-SS543-010	0.0	2.0	0.9	1.2	6.8	15.4	17.6	20.9	15.4	8.3	3.4	2.4	5.7	73.6
LDW-SS545-010	2.0	14.8	41.0	28.1	7.9	2.8	1.2	0.5	0.4	0.4	0.2	0.1	0.7	3.5
LDW-SS546-010	1.1	2.6	13.2	20.3	8.8	15.4	12.1	7.1	5.9	4.6	3.5	2.5	2.9	38.6
LDW-SS603-010	0.4	2.7	2.1	2.4	4.6	12.9	16.9	18.1	15.9	10.1	4.4	3.0	6.3	74.9

Notes to the Testing:
1. Organic matter was not removed prior to testing, thus the reported values are the "apparent" grain size distribution. See narrative for discussion of the testing.

QC19 : 00063

Windward Environmental, LLC
LDW Dioxin Sampling

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10	<4
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
LDW-SS544-010-comp	0.2	1.3	5.5	14.7	11.7	16.9	14.3	12.6	7.5	4.6	3.4	2.3	5.0	49.6
	0.3	1.1	5.7	14.8	11.6	16.6	14.1	13.3	7.4	4.6	3.5	2.0	5.1	50.0
	0.3	1.3	5.4	14.8	11.7	17.0	13.2	13.6	7.3	4.6	3.3	2.3	5.1	49.4
LDW-SS502-010-comp	7.9	5.1	18.3	39.7	19.3	3.6	1.3	0.7	0.5	0.7	0.9	0.8	1.1	6.0
LDW-SS503-043-comp	4.1	3.5	18.1	41.2	16.4	4.5	2.5	2.6	1.9	1.4	1.2	0.9	1.7	12.2
LDW-SS529-041-comp	24.1	6.2	15.8	24.1	11.5	6.2	2.7	2.4	2.2	1.9	1.1	0.7	1.3	12.3
LDW-SS531-010-comp	9.6	5.7	15.9	29.4	12.9	4.6	4.5	3.2	3.5	3.4	2.8	1.8	2.7	21.9
LDW-SS533-043-comp	13.1	4.5	9.9	30.6	18.1	7.1	4.5	3.4	2.6	1.7	1.5	1.0	2.0	16.7
LDW-SS547-010	1.4	1.2	1.9	8.0	17.9	16.5	12.7	14.1	9.5	6.3	4.6	2.5	3.3	53.1
LDW-SS520-010	1.3	2.0	8.3	21.3	13.5	6.0	4.0	8.6	10.0	9.1	5.6	3.3	7.1	47.7

Notes to the Testing:
1. Organic matter was not removed prior to testing, thus the reported values are the "apparent" grain size distribution. See narrative for discussion of the testing.

QF92 : 00032

CONVENTIONALS

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS501-010
ARI ID: 09-31124 QB98F

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	51.10
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	2.17

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Client ID: LDW-SS502-010-comp
ARI ID: 10-1102 QF92A

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	72.80
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	1.82

RL Analytical reporting limit
U Undetected at reported detection limit

REPLICATE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: QF92A Client ID: LDW-SS502-010-comp					
Total Solids	01/19/10	Percent	72.80	74.00 72.50	1.1%
Total Organic Carbon	01/20/10	Percent	1.82	1.81 2.36	15.8%

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Client ID: LDW-SS503-043-comp
ARI ID: 10-1103 QF92B

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	76.20
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	1.29

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS504-010
ARI ID: 09-31125 QB98G

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	68.30
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	1.38

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS505-010
ARI ID: 09-31126 QB98H

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	55.30
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	1.80

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS506-010
ARI ID: 09-31127 QB98I

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	56.40
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	2.12

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS507-010
ARI ID: 09-31128 QB98J

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	47.20
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	1.79

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS602-010
ARI ID: 09-31142 QB99L

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	47.00
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	1.97

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/15/09
Date Received: 12/17/09

Client ID: LDW-SS508-010
ARI ID: 09-31119 QB98A

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	41.10
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.136	6.77

RL Analytical reporting limit
U Undetected at reported detection limit

REPLICATE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/15/09
Date Received: 12/17/09

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: QB98A Client ID: LDW-SS508-010					
Total Solids	12/22/09	Percent	41.10	42.00 42.10	1.3%
Total Organic Carbon	12/28/09	Percent	6.77	6.85 5.28	14.0%

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/15/09
Date Received: 12/17/09

Client ID: LDW-SS509-010
ARI ID: 09-31123 QB98E

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	40.30
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	7.08

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS510-010
ARI ID: 09-31129 QB98K

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	48.60
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	1.99

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS511-010
ARI ID: 09-31190 QC15A

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	43.70
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	2.53

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS512-010
ARI ID: 09-31130 QB98L

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	64.50
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	1.74

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS513-010
ARI ID: 09-31191 QC15B

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	47.90
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	2.13

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS514-010
ARI ID: 09-31131 QB99A

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	53.40
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	1.63

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS515-010
ARI ID: 09-31132 QB99B

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	53.80
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	2.86

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS516-010
ARI ID: 09-31133 QB99C

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	53.20
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	1.96

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS517-010
ARI ID: 09-31134 QB99D

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	52.80
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	2.40

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS518-010
ARI ID: 09-31135 QB99E

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	52.50
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	2.06

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS519-010
ARI ID: 09-31136 QB99F

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	47.10
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	2.17

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Client ID: LDW-SS520-010
ARI ID: 10-1109 QF92H

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	59.70
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	2.10

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS521-010
ARI ID: 09-31137 QB99G

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	50.70
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	2.18

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS522-010
ARI ID: 09-31138 QB99H

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	43.20
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	2.86

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/15/09
Date Received: 12/17/09

Client ID: LDW-SS523-010
ARI ID: 09-31120 QB98B

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	76.70
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	0.982

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/15/09
Date Received: 12/17/09

Client ID: LDW-SS601-010
ARI ID: 09-31121 QB98C

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	77.80
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	0.906

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS524-010
ARI ID: 09-31192 QC15C

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	47.40
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	2.40

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS525-010
ARI ID: 09-31139 QB99I

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	74.40
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	0.665

RL Analytical reporting limit
U Undetected at reported detection limit

REPLICATE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: QB99I Client ID: LDW-SS525-010					
Total Solids	12/22/09	Percent	74.40	73.60 73.00	1.0%
Total Organic Carbon	12/29/09	Percent	0.665	0.748 0.605	10.7%

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS526-010
ARI ID: 09-31140 QB99J

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	68.80
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	1.79

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS527-010
ARI ID: 09-31193 QC15D

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	46.60
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	2.35

RL Analytical reporting limit
U Undetected at reported detection limit

REPLICATE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: QC15D Client ID: LDW-SS527-010					
Total Solids	12/23/09	Percent	46.60	47.50 47.30	1.0%
Total Organic Carbon	12/31/09	Percent	2.35	2.06 2.13	6.9%

SAMPLE RESULTS-CONVENTIONALS
QC19-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS603-010
ARI ID: 09-31214 QC19G

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	47.40
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	2.43

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB99-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/16/09
Date Received: 12/17/09

Client ID: LDW-SS528-010
ARI ID: 09-31141 QB99K

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	40.80
Total Organic Carbon	12/29/09 122909#1	Plumb,1981	Percent	0.020	3.04

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Client ID: LDW-SS529-041-comp
ARI ID: 10-1104 QF92C

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	75.60
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	1.47

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QB98-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 12/31/09

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/15/09
Date Received: 12/17/09

Client ID: LDW-SS530-010
ARI ID: 09-31122 QB98D

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/22/09 122209#1	EPA 160.3	Percent	0.01	81.20
Total Organic Carbon	12/28/09 122809#1	Plumb,1981	Percent	0.020	1.56

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/12/10
Date Received: 01/18/10

Client ID: LDW-SS531-010-comp
ARI ID: 10-1105 QF92D

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	73.30
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	1.23

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS532-010
ARI ID: 09-31194 QC15E

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	51.30
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	2.27

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/12/10
Date Received: 01/18/10

Client ID: LDW-SS533-043-comp
ARI ID: 10-1106 QF92E

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	74.40
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	1.40

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS534-010
ARI ID: 09-31195 QC15F

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	64.60
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	1.72

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS535-010
ARI ID: 09-31196 QC15G

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	69.00
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	1.38

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS536-010
ARI ID: 09-31197 QC15H

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	65.80
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	1.05

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS537-010
ARI ID: 09-31198 QC15I

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	54.30
Total Organic Carbon	12/31/09 123109#1	Plumb,1981	Percent	0.020	1.54

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS538-010
ARI ID: 09-31199 QC15J

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	60.10
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	2.15

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS539-010
ARI ID: 09-31200 QC15K

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	67.10
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	1.37

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC15-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS540-010
ARI ID: 09-31201 QC15L

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	58.50
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	1.45

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC19-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS541-010
ARI ID: 09-31208 QC19A

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	69.90
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	1.10

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC19-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS542-010
ARI ID: 09-31209 QC19B

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	62.00
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	1.16

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC19-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS543-010
ARI ID: 09-31210 QC19C

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	45.40
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	3.64

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/12/10
Date Received: 01/18/10

Client ID: LDW-SS544-010-comp
ARI ID: 10-1107 QF92F

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	62.70
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	1.88

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC19-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS545-010
ARI ID: 09-31211 QC19D

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	77.40
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	1.01

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QC19-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized
Reported: 01/07/10

Project: LDW Dioxin Sampling
Event: 04-08-06-29
Date Sampled: 12/17/09
Date Received: 12/18/09

Client ID: LDW-SS546-010
ARI ID: 09-31212 QC19E

Analyte	Date	Method	Units	RL	Sample
Total Solids	12/23/09 122309#1	EPA 160.3	Percent	0.01	58.90
Total Organic Carbon	01/04/10 010410#1	Plumb,1981	Percent	0.020	2.60

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
QF92-Windward Environmental, LLC

ANALYTICAL RESOURCES INCORPORATED

Matrix: Sediment
Data Release Authorized:
Reported: 01/21/10

Project: LDW Dioxin Sampling
Event: NA
Date Sampled: 01/11/10
Date Received: 01/18/10

Client ID: LDW-SS547-010
ARI ID: 10-1108 QF92G

Analyte	Date	Method	Units	RL	Sample
Total Solids	01/19/10 011910#1	EPA 160.3	Percent	0.01	52.30
Total Organic Carbon	01/20/10 012010#1	Plumb,1981	Percent	0.020	2.04

RL Analytical reporting limit
U Undetected at reported detection limit