Lower Duwamish Waterway Group

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

TECHNICAL MEMORANDUM:
SUMMARY OF SEDIMENT AND TISSUE CHEMISTRY DATASETS TO BE USED IN THE PHASE 2 RI/FS

FINAL

For submittal to

The US Environmental Protection Agency
Region 10
Seattle, WA

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

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Acronyms

Acronym	Definition
ARI	Analytical Resources, Inc.
CAS	Columbia Analytical Services, Inc.
CSO	combined sewer overflow
DQI	data quality indicator
DQO	data quality objective
Ecology	Washington State Department of Ecology
EPA	US Environmental Protection Agency
HPLC/PDA	high-pressure liquid chromatography/photodiode array
ICP-MS	inductively coupled plasma-mass spectrometry
KC WQA	King County (1999a) Water Quality Assessment
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
MS/MSD	matrix spike/matrix spike duplicate

Acronym	Definition
NOAA	National Oceanic and Atmospheric Administration
OIG	Office of the Inspector General
OPR	ongoing precision and recovery
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCT	polychlorinated terphenyl
PSDDA	Puget Sound Dredged Disposal Authority
PSEP	Puget Sound Estuary Program
QA/QC	quality assurance/quality control
QA1	summary data validation (EPA 1999, 2002c)
QA2	full data validation (EPA 1999, 2002c)
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RPD	relative percent difference
RSD	relative standard deviation
SEA	Striplin Environmental Associates
SRM	standard reference material
SVOC	semivolatile organic compound
TBT	tributyltin
TOC	total organic carbon
TPH	total petroleum hydrocarbons
USACE	US Army Corps of Engineers
VOC	volatile organic compound
Windward	Windward Environmental LLC

1.0 Introduction

The Lower Duwamish Waterway Group (LDWG) is conducting a Remedial Investigation (RI) of the Lower Duwamish Waterway (LDW). The Phase 1 RI report, which was completed by Windward Environmental LLC (Windward) in 2003 (Windward 2003b), was based on existing sediment and tissue chemistry data that were considered acceptable for use in Phase 1 (Windward 2001a, b). The Phase 1 database was finalized, as agreed to by the US Environmental Protection Agency (EPA) and the Washington Department of Ecology (Ecology), in December 2001, so chemistry data collected or made available to Windward after that time were not incorporated into Phase 1.

Phase 2 of the RI will consider the following additional data:

- Data collected by other parties prior to the end of 2001, but not discovered during Phase 1 data compilation
- Data collected by other parties after the end of 2001
- Data collected by LDWG members for purposes other than the RI, including Early Action Area investigations
- Data collected specifically for the Phase 2 RI, as described in the Phase 2 RI work plan (Windward 2004c)

These data will be combined with the data used in Phase 1 to characterize the nature and extent of contamination in the LDW, and to assess the risks to humans, fish, wildlife, and benthic invertebrates.

The Phase 2 RI work plan (Windward 2004c) outlines the study designs for any additional data collection. These designs will be finalized in the Quality Assurance Project Plan (QAPP) specific to each study. All data collected in these studies will be designed to meet the DQOs for Phase 2 presented in this document. Completion of the study designs requires that all acceptable and relevant chemistry data be compiled and made available in the LDW project database. Chemistry data collected specifically for the Phase 2 RI will be collected in accordance with EPA- and Ecology-approved QAPPs, and will be subject to data validation in accordance with EPA's functional guidelines (EPA 1999, 2002c), so these data are not addressed in this memorandum. Consequently, this memorandum summarizes the quality of chemistry data collected by other parties and describes criteria for determining the acceptable uses of these data in Phase 2. Non-chemistry data (e.g., benthic invertebrate community) are not addressed. This memorandum also summarizes the quality of chemistry data in datasets previously used in Phase 1. Summaries of Phase 1 data quality have been previously prepared by both Windward, on behalf of LDWG (Windward 2001b, 2003a, 2004a), and EPA (2003; 2004), but are also referenced in this memorandum to provide a comprehensive summary of all existing chemistry datasets that will be used in Phase 2. The scope of this and previous memoranda on this topic is limited to laboratory quality assurance/quality control chemistry data. There may be other issues that limit specific uses of these data in Phase 2. If such limitations exist, they will be discussed in the Phase 2 RI and risk assessments.

After completion of this memorandum, additional datasets are likely to be generated by other parties or by LDWG members for purposes other than the RI. LDWG will review these additional datasets and submit draft addenda to this technical memorandum with an assessment of whether these data are of acceptable quality for use in the Phase 2 RI/FS. The need for such addenda will be determined based on the expected timeframe for use of the datasets in question during Phase 2. At this time, it is anticipated that addenda may be prepared as frequently as every 6 months. The schedule for such addenda will be discussed with EPA and Ecology once additional datasets are identified.

Section 2 of this memorandum describes the data quality objectives (DQOs) established for Phase 1 and discusses additional DQOs applicable for Phase 2. Section 3 summarizes the historical sediment and tissue chemistry datasets collected by others that were reviewed for potential use during Phase 2. Section 4 presents a summary of the data quality reviews.

2.0 Data Quality Objectives

DQOs are typically established for large and complex investigations such as an RI to provide all parties with a common benchmark for determining data acceptability for making risk estimates and for developing risk-based goals that ultimately are used for cleanup decisions. The DQO process used to identify data for inclusion in the Phase 1 RI and risk assessments was documented in a memorandum submitted to EPA and Ecology in May 2001 (Windward 2001a). The process was reviewed and approved by EPA and Ecology for the Phase 1 RI. At a minimum, data to be used in Phase 2 will be expected to meet the Phase 1 DQOs, which are summarized below. Additional DQOs that have been recommended for Phase 2 are then discussed, following review of the Phase 1 DQOs.

DQOs were categorized according to the level at which each DQO would be applied: event, station, sample, or result. For example, a DQO applied at the result level could cause a result record to be qualified for a particular chemical, but not for other chemicals analyzed during the same study. Table 2-1 lists the DQOs that had to be satisfied for chemistry data to be considered for inclusion in the Phase 1 RI.

Table 2-1. Data quality objectives applied to Phase 1 chemistry data

Event Level
Hard copy or original electronic copy of data report must be available
Field coordinates must be available
Data must have been collected since 1990
Data must have been collected using appropriate sampling methods
Station Level
Stations located within dredge prisms or remediated areas should be identified
Sample Level
Sediment depth sampled should be identified
Sample type should be clearly identified
Result Level
For non-detects, detection limits and appropriate qualifiers must be given
Calculated values must be recalculated
Analytical methods must be identified
Quality assurance/quality control information must be available

As noted above, while these DQOs are still relevant for Phase 2, additional project-specific DQOs have been established by EPA during their recent data quality review (EPA 2003). The additional DQOs are related to the availability of quality assurance/quality control (QA/QC) information, as listed under Result Level in Table 2-1. For Phase 1, data quality was considered sufficient if some level of data validation was performed and documented in the data report. Any results that were rejected during the data validation were not used in Phase 1. Differences in the level QA/QC information for Phase 2 will include the level of data validation and the manner in which it is documented. Two different levels of data validation are generally recognized. A summary data validation, referred to as QA1, represents a lower level of effort compared to a full validation, referred to as QA2. The elements of summary and full data validations for environmental chemistry data are shown in Table 2-2 (EPA 1999, 2002c).

Table 2-2. Elements of summary and full data validations for environmental chemistry data

Element	Applicable Analyses	Summary Data Validation (QA1)	Full Data Validation (QA2)
Quality control analysis frequencies	all	X	X
Analysis holding times	all	X	X
Instrument performance check	organics, ICP-MS metals		X
Initial instrument calibration	all		X
Continuing instrument calibration	all		X
Laboratory blanks	all	X	X
ICP interference check sample	metals		X

Element	Applicable Analyses	Summary Data Validation (QA1)	Full Data Validation (QA2)
System monitoring compounds (surrogates)	organics	X	X
Matrix spikes/matrix spike duplicates	all	X	X
Laboratory control samples	all	X	X
ICP serial dilution	metals		X
Field QA/QC (field blanks, field duplicates)	all	X	X
Internal standards	VOCs, SVOCs, ICP-MS metals		X
Pesticide cleanup checks	pesticides/PCBs		X
Target compound identification and quantitation (requires verification of reported results with raw data)	organics		X
Reporting limits	all	X	X

ICP-MS – Inductively coupled plasma-mass spectrometry

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

VOC – volatile organic compound

While EPA has no established definitive guidelines specifying level of data validation required for Superfund investigations, EPA Order 5360.1 and OSWER Directive 9355.9-01 (EPA-540-G93-071 Data Quality Process for Superfund, Interim Final, Sept. 1993), require environmental measurements to be of known quality, verifiable and defensible. The Office of the Inspector General (OIG) concluded in an audit of Region 9 Superfund Sites (OIG Environmental Data Quality Audit Report at Department of Defense Superfund Sites in Region 9, EPA/OIG #5100505, 1995) that data used for cleanup decision-making should be validated using EPA functional guidelines (EPA 1999, 2002c). The use of functional guidelines for validation includes the evaluation of all the QA2 elements listed in Table 2-2 for full data validation and the verification of the reported results with the raw data.

EPA's detailed review of the Phase 1 data (EPA 2003) focused on datasets with initial validations equivalent to QA1. In those cases, the QA1 validation reports were reviewed for QC problems and consistency of the application of data qualifiers with the EPA functional guidelines. For datasets with apparent problems with QC results, EPA conducted a comprehensive data quality review focused on the determination of the cause and effects of the QC problems on the quality of the data reported, as per EPA (EPA 2002a) guidance, and applied validation qualifiers to the affected results consistent with the EPA functional guidelines.

EPA's information quality guidelines (EPA 2002b) require that a historical dataset to be used for decision-making must be of known quality, legally defensible, and must have undergone the same level of scrutiny and review as any other environmental data generated internally or externally by or for EPA. Based on these guidelines and on the example data quality review provided by EPA (2003), the following additional three DQOs have been established for a dataset to be acceptable for all uses in Phase 2:

- Data validation qualifiers must be present, or derivable from laboratory qualifiers or QA information, and must be applied in a manner consistent with EPA functional guidelines (EPA 1999, 2002c). Laboratory qualifiers provide information about data quality, but each laboratory has different criteria for assigning qualifiers, and no general standard of comparability has been established. Application of data validation qualifiers defined by EPA will allow data users to assess data quality across multiple datasets simultaneously using a consistent set of guidelines.
- **Data reports must contain laboratory-generated forms (often called Form 1s) with the results for each sample.** Electronic data can be compared to Form 1s as a QC check to ensure that data generated by the laboratory have been accurately transferred to the LDW project database.
- Existence and location of documentation supporting the dataset, including the analytical raw data, chain of custody forms, and sample handling descriptions, must be known for future reference, confirmation, and/or reproducibility by a third party.

These three additional DQOs apply to the entire sampling event. Chemistry datasets meeting the DQOs outlined in Table 2-1 and these three additional DQOs will be considered acceptable for all uses in Phase 2. Such data will inform the study designs described in Phase 2 QAPPs and be used in the risk assessments and RI report. Data of acceptable quality may still be associated with uncertainty in the risk assessments. For example, chemicals not detected in a sample may actually be present, but their concentration below the detection limit is unknown. This uncertainty applies to all cases in which chemicals are reported as undetected, but the magnitude of the uncertainty is greater for samples in which the detection limits are elevated above what is typically achieved by commercial laboratories. Although this greater uncertainty applies to some chemicals in some samples, none of the sampling events summarized in this memo have been excluded in their entirety because of elevated detection limits. The uncertainties associated with data quality will be discussed in the Phase 2 RI and risk assessments.

3.0 Historical LDW Sediment and Tissue Chemistry Datasets

3.1 Dataset Summary

This section lists the sediment and tissue datasets that were used in Phase 1 and the additional datasets that were evaluated for inclusion in Phase 2 as part of this memorandum. Separate tables are presented for Phase 1 sediment (Table 3-1), Phase 1 tissue (Table 3-2), and historical datasets that were not included in Phase 1 either because: 1) they were collected after the 2001 cutoff date for inclusion in Phase 1, or 2) they were not discovered during Phase 1 data compilation (Table 3-3). An expanded summary table of the historical datasets described in Tables 3-1, 3-2, and 3-3 is provided in Appendix A. This appendix also summarizes datasets that will not be included in the Phase 2 RI/FS.

Table 3-1. Sediment chemistry datasets used in the Phase 1 RI

Sampling Event	Event Code	Year	Chemicals	Number of Samples		Reference
				Surface (≤10 cm)	Subsurface (> 10 cm)	
Norfolk CSO five-year monitoring program, Year Two, April 2001	Norfolk-monit4	2001	metals, PCB Aroclors, SVOCs	8	0	King County (2001b)
Norfolk CSO five-year monitoring program – Twelve-month post construction	Norfolk-monit3	2000	metals, PCB Aroclors, SVOCs	8	0	King County (2000c)
Norfolk CSO five-year monitoring program – Supplemental nearshore sampling	Norfolk-monit2b	2000	PCB Aroclors	6	0	King County (2000b)
Norfolk CSO five-year monitoring program – Six-month post construction	Norfolk-monit2a	1999	metals, PCB Aroclors, SVOCs	8	0	King County (2000d)
Norfolk CSO five-year monitoring program – Post backfill	Norfolk-monit1	1999	metals, PCB Aroclors, SVOCs	4	0	King County (1999b)
Dredge material characterization Duwamish Yacht Club	Duwam Yacht Club	1999	metals, pesticides, PCB Aroclors, SVOCs, VOCs, TBT	0	6	Hart Crowser (1999)
Sediment sampling and analysis James Hardie Gypsum Inc. – Round 1	Hardie Gypsum-1	1999	metals, pesticides, PCB Aroclors, SVOCs, VOCs	0	5	Spearman (1999)
Sediment sampling and analysis James Hardie Gypsum Inc. – Round 2	Hardie Gypsum-2	1999	metals, pesticides, PCB Aroclors, SVOCs, VOCs	0	9	Spearman (1999)
Dredge material characterization Hurlen Construction Company & Boyer Alaska Barge Lines berthing areas	Hurlen-Boyer	1998	metals, pesticides, PCB Aroclors, SVOCs, TBT, TPH	0	6	Hart Crowser (1998)
Sediment quality in Puget Sound. Year 2 – Central Puget Sound	PSAMP/ NOAA98	1998	metals, PCB Aroclors, pesticides, SVOCs, TBT	3	0	Ecology (2000)
EPA Site Inspection: Lower Duwamish River	EPA SI	1998	metals, pesticides, PCB Aroclors & selected congeners, dioxins & furans, TBT, SVOCs, VOCs	300	33	Weston (1999)
King County combined sewer overflow water quality assessment for the Duwamish River and Elliott Bay	KC WQA	1997	metals, PCB Aroclors, SVOCs, TBT	69	0	King County (1999a)

Sampling Event	Event Code	Year	Chemicals	Number of Samples		Reference
				Surface (≤10 cm)	Subsurface (> 10 cm)	
Duwamish Waterway Phase 1 site characterization	Boeing SiteChar	1997	metals, PCB Aroclors, SVOCs	88 [a]	0	Exponent (1998)
Duwamish Waterway sediment characterization study	NOAA SiteChar	1997	total PCBs, selected PCB congeners, total PCTs	328	0	NOAA (1997; 1998)
Seaboard Lumber site, Phase 2 site investigation	Seaboard-Ph2	1996	metals, PCB Aroclors, SVOCs	20	0	Herrera (1997)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 2b	Plant 2 RFI-2b	1996	metals, PCB Aroclors, SVOCs	39	44	Weston (1998)
Proposed dredging of Slip No. 4, Duwamish River, Seattle, WA	Slip4-Crowley	1996	metals, pesticides, PCB Aroclors, SVOCs, VOCs, TBT	0	4	PTI (1996)
Duwamish/Diagonal cleanup Study – Phase 2	Duw/ Diag-2	1996	metals, PCB Aroclors, SVOCs, TPH	36	53	King County (2000a)
1996 USACE Duwamish O&M	PSDDA96	1996	metals, pesticides, PCB Aroclors, SVOCs, VOCs,	0	4	Striplin (1996)
Duwamish/Diagonal cleanup Study – Phase 1.5	Duw/ Diag-1.5	1995	metals, PCB Aroclors, SVOCs, TBT	12	0	King County (2000a)
Lone Star Northwest and James Hardie Gypsum – Kaiser dock upgrade	Lone Star-Hardie Gypsum	1995	metals, pesticides, PCB Aroclors, SVOCs, VOCs	0	5	Hartman (1995)
Norfolk CSO sediment cleanup study – Phase 3	Norfolk-cleanup3	1995	PCB Aroclors	16	0	King County (1996)
Norfolk CSO sediment cleanup study – Phase 2	Norfolk-cleanup2	1995	metals, pesticides, PCB Aroclors and selected congeners, SVOCs, VOCs, TPH	12	27	King County (1996)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 2a	Plant 2 RFI-2a	1995	metals, PCB Aroclors SVOCs	54	0	Weston (1998)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 1	Plant 2 RFI-1	1995	metals, PCB Aroclors, TPH, SVOCs, VOCs	65	22	Weston (1998)
Duwamish/Diagonal cleanup Study – Phase 1	Duw/ Diag-1	1994	metals, pesticides, PCB Aroclors, SVOCs, TBT	40 [b]	12	King County (2001a)
Norfolk CSO sediment cleanup study – Phase 1	Norfolk-cleanup1	1994	metals, pesticides, SVOCs, PCB Aroclors, VOCs	21	3	King County (1996)
Rhône-Poulenc RCRA Facility Investigation for the Marginal Way facility – Round 2	Rhône-Poulenc RFI-2	1994	metals, SVOCs, PCB Aroclors 1254 and 1260, pesticides	7	0	Rhône-Poulenc (1995)
Rhône-Poulenc RCRA Facility Investigation for the Marginal Way facility – Round 1	Rhône-Poulenc RFI-1	1994	metals, SVOCs, PCB Aroclor 1254, pesticides	7 [c]	0	Rhône-Poulenc (1995)
Lone Star Northwest – West Terminal US ACOE – Seattle	Lone Star 92	1992	metals, pesticides, PCB Aroclors, SVOCs, VOCs	0	1	Hartman (1992)

Sampling Event	Event Code	Year	Chemicals	Number of Samples: Surface (≤10 cm)	Number of Samples: Subsurface (> 10 cm)	Reference
Harbor Island Remedial Investigation	Harbor Island RI	1991	metals, pesticides, PCB Aroclors, SVOCs, VOCs, TPH, TBT	34	0	Weston (1993)

[a] Sample total does not include three reference samples that were collected upstream of the study area

[b] Two samples were collected to a depth of 15 cm, but were considered surface samples for the Phase 1 RI

[c] All samples were collected to a depth of 15 cm, but were considered surface samples for the Phase 1 RI

NOAA – National Oceanic and Atmospheric Administration

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

PCT – polychlorinated terphenyl

RCRA – Resource Conservation and Recovery Act

SVOC – semivolatile organic compound

TBT – tributyltin

TPH – total petroleum hydrocarbon

VOC – volatile organic compound

Table 3-2. Tissue chemistry datasets used in the Phase 1 RI

Sampling Event	Event Code	Year	Chemicals	Species	n [a]	Sample type	Reference
NMFS Duwamish injury assessment project	NOAA-salmon2	2000	PCBs, pesticides	chinook salmon (juveniles)	29	whole body	NMFS (2002)
					6	stomach contents	
Waterway Sediment Operable Unit Harbor Island Superfund Site	WSOU	1998	Hg, TBT, PCBs	English sole	3	skinless fillet	ESG (1999)
				red rock crab	3	edible meat	
				Dungeness crab	1	edible meat	
				striped perch	3	skinless fillet	
King County Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay [b]	KC WQA	1996-1997	metals, TBT, SVOCs, PCBs	Dungeness crab	2	edible meat	King County (1999a)
					1	hepatopancreas	
				English sole	3	skinless fillet	
					3	whole body [c]	
				amphipods	4	whole body	
				shiner surfperch	3	whole body	
				mussels	22	whole body	

SAMPLING EVENT	EVENT CODE	YEAR	CHEMICALS	SPECIES	n [a]	SAMPLE TYPE	REFERENCE
Puget Sound Ambient Monitoring Program – annual sampling	PSAMP -fish	1992	SVOCs, pesticides, PCBs, As, Cu, Pb, Hg	English sole	3	skinless fillet	West et al. (2001)
		1992		coho salmon [d]	6	skinless fillet	
		1992		chinook salmon [d]	6	skinless fillet	
		1993	pesticides, PCBs, As, Cu, Pb, Hg	coho salmon [d]	5	skinless fillet	
		1993		chinook salmon [d]	6	skinless fillet	
		1994		coho salmon [d]	5	skinless fillet	
		1994		chinook salmon [d]	7 [e]	skinless fillet	
		1995		coho salmon [d]	7 [e]	skinless fillet	
		1995		chinook salmon [d]	15 [f]	skinless fillet	
		1995		English sole	3	skinless fillet	
		1996		chinook salmon [d]	49 [g]	skinless fillet	
		1996		coho salmon [d]	19 [h]	skinless fillet	
		1997	Hg, pesticides	English sole	3	skinless fillet	
		1998		coho salmon [d]	13	skinless fillet	
Elliott Bay/Duwamish River Fish Tissue Investigation	EVS 95	1995	PCBs, Hg, MeHg, TBT	English sole	3	skinless fillet	Battelle (1996); EVS (unpublished); Frontier Geosciences (1996)
Contaminant exposure and associated biochemical effects in outmigrant juvenile chinook salmon from urban and non-urban estuaries of Puget Sound [i]	NOAA-salmon	1989-1990	pesticides, PCBs, PAHs	chinook salmon (juveniles)	14	whole body	Varanasi et al. (1993)
					6	stomach contents	

[a] Number of individual or composite samples

[b] Sample counts do not include data from cooked crab and English sole samples or data from caged mussel deployments. These data were not used in the Phase 1 RI.

[c] Samples are of remnant tissues following the subsampling of fillet tissue. In addition, livers were removed from some fish in the composite samples.

[d] Adult salmon; data were used to characterize the nature and extent of contamination in the RI, but were not used in the risk assessments because almost all the chemicals in these fish are associated with exposure outside the LDW

[e] One sample was an individual fish, not a composite sample

[f] Two samples were individual fish, not composite samples

[g] All samples were individual fish, not composite samples

[h] Five samples were individual fish, not composite samples

[i] Six composite samples of juvenile chinook salmon livers were also analyzed, but these data not used in the Phase 1 RI.

As – arsenic

Hg – mercury

MeHg – methylmercury

Cu – copper

Pb – lead

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

TBT – tributyltin

Table 3-3. Datasets not used in the Phase 1 RI

Sampling Event	Event Code	Year	Number of Samples by Medium [a]	Reference
Sediment chemistry				
Slip 4 early action area site characterization	Slip4-EarlyAction	2004	87 (29 surface sediment, 58 subsurface sediment)	unpublished data from Integral Consulting
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 5, April 2004.	Norfolk-monit7	2004	8 (surface sediment)	unpublished data from King County
Duwamish/Diagonal pre- and post-cleanup monitoring data	DuwDiag-Dredge Monitoring	2003-2004	24 (surface sediment; 12 before dredging, 12 after dredging)	unpublished data from King County
Terminal 117 early action area site characterization	T117Boundary Definition	2003-2004	147 (46 surface and 101 subsurface sediment) [c]	Windward (2004a; 2004b)
Additional vertical characterization, Duwamish Sediment Other Area	DSOAvertchar 2	2003	28 (subsurface sediment)	MCS Environmental (2004)
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 4, April 2003.	Norfolk-monit6	2003	8 (surface sediment)	King County (2003)
Sediment characterization results for the Duwamish River navigational channel turning basin	Turning-basin	2003	5 (subsurface sediment)	Anchor (2003)
Boeing Plant 2 transformer investigation – Phase 1	Plant 2-Transformer Phase1	2003	51 (5 surface and 46 subsurface sediment) [b]	Floyd Snider McCarthy (2004)
Norfolk combined sewer overflow (Duwamish River) sediment cap recontamination. Phase I investigation.	Ecology-Norfolk	2002	20 (surface sediment)	Ecology (2003)
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 3, April 2002.	Norfolk-monit5	2002	8 (surface sediment)	King County (2002)
Data report, DSOA vertical characterization and outfall 12 data collection. Duwamish sediment other area, Boeing Plant 2	DSOAvertchar	2001	125 (subsurface sediment)	Pentec (2001)
Outfall and nearshore sediment sampling report, Duwamish Facility	James Hardie Outfall	2000	9 (surface sediment)	Weston (2000)
PSDDA sediment characterization of Duwamish River navigation channel: FY2000 operations and maintenance dredging data report	PSDDA99	1999	20 (subsurface sediment)	Striplin (SEA 2000a, b)
PSDDA sediment characterization of Duwamish River navigation channel: FY99 operations and maintenance dredging data report.	PSDDA98	1998	10 (subsurface sediment)	Striplin (1998)
RCRA facility investigation (RFI) report for the Marginal Way facility. Round 3 data and sewer sediment technical memorandum.	Rhône PoulencRFI3	1996	16 (surface sediment) [a]	Rhône-Poulenc (1996)
Results of sampling and analysis, sediment monitoring plan, Duwamish Shipyard, Inc.	Duwamish Shipyard	1993	5 (surface sediment) [a]	Hart Crowser (1993)
Sediment sampling and analysis, South Park Marina, Duwamish Waterway, Seattle, Washington.	SouthPark Marina	1991	2 (subsurface sediment)	Spearman (1991)

Sampling Event	Event Code	Year	Number of Samples by Medium [a]	Reference
Tissue chemistry				
East Waterway, Harbor Island Superfund site: Technical memorandum: Tissue chemistry results for juvenile chinook salmon collected from Kellogg Island and East Waterway.	EW-Salmon	2002	12 (juvenile chinook salmon)	Windward (2002)
NMFS Duwamish injury assessment project	NOAA-salmon2	2000	2 (shiner perch)	NMFS (2002)
Preliminary exposure assessment of dioxin-like chlorobiphenyls in great blue herons of the lower Duwamish River	HeronUSFWS	1998	6 (great blue heron egg and yolk sac)	Krausmann (2002)

[a] Sample count does not include field duplicates

[b] Does not include soil and groundwater data, which were also collected during this event

[c] Does not include soil, groundwater, and seep data, which were also collected during this event

The datasets shown in Table 3-3 do not include historical investigations of upland media such as soils and groundwater. As summarized in the Phase 1 RI, these upland media may represent important sources of chemicals to LDW sediments at specific locations, but the compilation of historical data in Phase 1 and the collection of new chemistry data in Phase 2 are focused primarily on sediments and tissue.

Historical seep chemistry data have been collected for several upland sites in the LDW, but review of these data has not been completed. These historical datasets will be reviewed by Windward to determine whether they are acceptable for use in Phase 2. This review will be completed early in 2005 and an addendum to this technical memorandum will be prepared and submitted to EPA and Ecology by March 2005. This addendum will also include surface water chemistry data collected by King County during the 1996-1997 Water Quality Assessment of the LDW and Elliott Bay (King County 1999a). These data were summarized in the Phase 1 RI, but no determination has been made regarding acceptability of these data for use in Phase 2.

There may be additional chemistry data collected during Phase 2 by other parties that may also be used in Phase 2. For such data to be useful for the risk assessments, they must be reviewed and added to the LDW project database by October 2005 so that they can be incorporated into risk estimates that will be included in documents submitted to EPA and Ecology early in 2006. For such a deadline to be met, electronic data and associated validation reports would need to be received by August 2005, so the necessary reviews can occur. An addendum to this memorandum will be prepared documenting the data quality of any additional datasets used in Phase 2. Addenda will include the following elements:

- data quality review by event, such as those presented in Section 3.2 of this memorandum
- update to summary tables listing datasets to be used in the Phase 2 RI/FS (see Appendix A)

- sample-specific data qualifier changes based on the data quality review (see Appendix B)

Non-chemistry datasets (e.g., benthic invertebrate community characterization data) are also not included in this memorandum. Data from such investigations may be useful for study designs in several upcoming QAPPs, but the data won't be added to the LDW project database. Data quality for non-chemistry datasets will be described in the appropriate QAPPs. For example, benthic invertebrate community data collected from the LDW in recent years are considered in the Phase 2 study design described in the benthic invertebrate QAPP (Windward 2004b).

3.2 DATA QUALITY REVIEW SUMMARY

This section summarizes the data quality reviews conducted by EPA and Windward on the datasets summarized in Tables 3-1 and 3-2, as well as reviews conducted for this memorandum on the datasets summarized in Table 3-3. Individual datasets are hereafter referred to by the event codes given in Tables 3-1, 3-2, and 3-3. The order in which the datasets are discussed is tied to the order shown in Tables 3-4 and 3-5.

The data quality review conducted by EPA established three categories for the datasets shown in Tables 3-1 and 3-2 (EPA 2003):

- Category 1 – reviewed by EPA QA staff for the LDW RI
- Category 2 – previously approved for use by EPA
- Category 3 – not reviewed by EPA because of time constraints and resource limitations

Summaries of the data quality reviews conducted by EPA or Windward on datasets listed in Table 3-1 (Phase 1 datasets) are provided in Table 3-4; summaries of the data quality reviews of datasets not previously summarized are provided in Table 3-5. Some of the datasets listed in Tables 3-1 and 3-2 that were not previously reviewed by EPA (i.e., Category 3) were also not reviewed by Windward because LDWG decided the data in these datasets were not appropriate for risk estimates or additional site characterization during Phase 2. If it is determined that these datasets may be useful for these purposes at a later time, the appropriate data quality review will occur and will be summarized in an addendum to this memorandum.

Specific data quality issues researched by EPA or Windward for particular datasets are described in greater detail later in this section, as referenced in the "Actions" column of Table 3-4 and the "Summary" column of Table 3-5. Data not reviewed or considered not acceptable for use because DQOs were not met are not discussed other than the summary in Tables 3-4 and 3-5. These data may still be useful for some purposes, as described in Section 3.3. The data quality review conclusions are also summarized in Appendix A.

Table 3-4. Summary of data quality reviews for sediment and tissue chemistry datasets previously used in Phase 1

Event Code	Year	Category [a]	Reviewer	Actions	Acceptable for All Phase 2 Uses?
Sediment chemistry					
Norfolk-monit4	2001	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Norfolk-monit3	2000	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Norfolk-monit2b	2000	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Norfolk-monit2a	1999	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Norfolk-monit1	1999	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Duwam Yacht Club	1999	3	none [b]	none	no
Hardie Gypsum-1	1999	3	none [b]	none	no
Hardie Gypsum-2	1999	3	none [b]	none	no
Hurlen-Boyer	1998	3	none [b]	none	no
PSAMP/NOAA98	1998	3	none [c]	none	no
EPA SI	1998	2	EPA	none	yes
KC WQA	1997	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Boeing SiteChar	1997	3	Windward	see Section 3.2.2	yes
NOAA SiteChar	1997	1	EPA	validation qualifiers added to database (Section 3.2.3)	no (see Section 3.2.3 and 3.3 for additional explanation)
Seaboard-Ph2	1996	3	Windward	see Section 3.2.4	yes
Plant 2 RFI-2b	1996	2	EPA	Validation qualifiers J+/J- changed to JH/JL	yes
Slip4-Crowley	1996	3	none	none	no
Duw/Diag-2	1996	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
PSDDA96	1996	3	none [b]	none	no
Duw/Diag-1.5	1995	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Lone Star-Hardie Gypsum	1995	3	none [b]	none	no
Norfolk-cleanup3	1995	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Norfolk-cleanup2	1995	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Plant 2 RFI-2a	1995	2	EPA	validation qualifiers J+/J- changed to JH/JL	yes

EVENT CODE	YEAR	CATEGORY [a]	REVIEWER	ACTIONS	ACCEPTABLE FOR ALL PHASE 2 USES?
Plant 2 RFI-1	1995	2	EPA	validation qualifiers J+/J- changed to JH/JL	yes
Duw/Diag-1	1994	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Norfolk-cleanup1	1994	1	EPA	validation qualifiers added to database (Section 3.2.1)	yes
Rhône-Poulenc RFI-2	1994	3	Windward	see Section 3.2.5	yes
Rhône-Poulenc RFI-1	1994	3	Windward	see Section 3.2.5	no
Lone Star 92	1992	3	none [b]	none	no
Harbor Island RI	1991	2	EPA	none	yes
Tissue chemistry					
NOAA-salmon2 – salmon	2000	1	EPA	pending [e]	pending
NOAA-salmon2 – perch [d]	2000	1	EPA	none	yes
WSOU	1998	2	EPA	none	yes
KC WQA	1996-1997	1	EPA	validation qualifiers added to database (Section 3.2.1)	no (English sole whole body because they do not truly represent whole bodies); yes (remaining data)
PSAMP-fish	1992	3	Windward	see Section 3.2.6	yes
	1993	1	EPA	none	no (SVOC data), yes (remaining data)
	1994	3	none [f]	none	no
	1995	3	Windward	see Section 3.2.6	yes (English sole only; adult salmon data not reviewed)
	1996	3	none [f]	none	no
	1997	3	Windward	see Section 3.2.6	yes (English sole only; adult salmon data not reviewed)
	1998	3	none [f]	none	no
EVS 95	1995	2	EPA	none	yes
NOAA-salmon	1989-1990	3	none	none [e]	no

[a] Category 1 – reviewed by EPA QA staff for the LDW RI

Category 2 – previously approved for use by EPA

Category 3 – not reviewed by EPA because of time constraints and resource limitation

[b] LDWG did not conduct a review of this dataset because the dredged material characterized during this event was subsequently removed from the LDW. These data would not be used for risk calculations. No “z” samples (i.e., samples collected from a depth below the proposed dredge prism) that could be considered representative of site conditions were analyzed. Consequently, the effort that would have been required to obtain this QA/QC information was not justified for the purposes of the Phase 2 RI/FS and risk assessments.

[c] LDWG did not conduct a review of this dataset because the effort that would have been required to obtain and review the QA/QC information for only three samples was not justified for the purposes of the Phase 2 RI/FS and risk assessments.

[d] The perch samples from this event were not included in the Phase 1 RI, but EPA included these data in their 2003 historical data review

[e] EPA is discussing with NOAA whether an EPA QA review of these data is warranted. Neither LDWG nor EPA plan to conduct a review of this dataset because the results of LDWG’s 2003 juvenile chinook salmon sampling make the effort required to conduct such a review unwarranted, as summarized in Windward (2005).

[f] LDWG did not conduct a review of this dataset because only adult salmon were included. Adult salmon chemistry data will not be an important part of the Phase 2 RI and risk assessments because the chemicals in these fish have little or no association with the LDW.

Data qualifier definitions

J+ and JH = Analyte was positively identified and detected; however, concentration is probably biased high

J- and JL = Analyte was positively identified and detected; however, concentration is probably biased low

Table 3-5. Summary of data quality reviews conducted by Windward for datasets not previously used in Phase 1

Event Code	Year	Summary	Acceptable for All Phase 2 Uses?
Sediment data			
Slip4-EarlyAction	2004	data validation and data quality review consistent with EPA guidelines; data collected under existing LDW RI Administrative Order on Consent (AOC), so no data quality review is needed in this memorandum	yes; EPA QA office also currently reviewing
DSOAvertchar2	2003	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.7)	yes
Norfolk-monit7	2004	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.8)	yes
DuwDiag-DredgeMonitoring	2003-2004	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.9)	yes
T117BoundaryDefinition	2003-2004	data validation and data quality review consistent with EPA guidelines; data collected under existing LDW RI AOC, so no data quality review is needed in this memorandum	yes; EPA QA office also currently reviewing
Norfolk-monit6	2003	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.10)	yes
Turning-basin	2003	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.11)	yes
Plant2-TransformerPhase1	2003	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.12)	yes
Ecology-Norfolk	2002	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.13)	yes
Norfolk-monit5	2002	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.14)	yes
DSOAvertchar	2001	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.15)	yes
JamesHardieOutfall	2000	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.16)	yes
PSDDA99	1999	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.17)	yes
PSDDA98	1998	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.18)	yes

Event Code	Year	Summary	Acceptable for All Phase 2 Uses?
RhônePoulencRFI3	1996	data validation consistent with EPA guidelines; laboratory Form 1s not present in data report	no
DuwamishShipyard	1993	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.19)	yes
SouthPark Marina	1991	data not reviewed because of age of data; associated sediment was dredged	no
Tissue data			
EW-Salmon	2002	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.20)	yes
HeronUSFWS	1998	no formal data validation conducted, laboratory Form 1s not present in data report; EPA plans to conduct additional QA review of this dataset	pending

Each of the datasets listed in Tables 3-4 and 3-5 have been validated at some level. Summaries of the data validations for the datasets previously used in Phase 1 were included in a previous Phase 1 deliverable (Windward 2001b). Additional data quality issues for some of the datasets previously used in Phase 1 are discussed below in Sections 3.2.1 to 3.2.6. Category 1 and 2 datasets listed in Table 3-4 are not discussed further in this memorandum. Summaries of data validations for datasets not previously reviewed during Phase 1, but now considered acceptable for use in Phase 2 based on the reviews summarized in this memorandum, are included in Sections 3.2.7 to 3.2.16. Table 3-6 defines the laboratory and validation qualifiers used in this memorandum.

Table 3-6. Laboratory and validation qualifier definitions

	Qualifier Code	Definition
Laboratory qualifiers		
	U	Result is not detected at the reporting limit shown
	B	Blank contamination is present
	<MDL	Value is less than method detection limit
	<RDL	Value is less than reporting limit
	E (King County)	Value is estimated because data quality objectives for precision were not met
	G (King County)	Value is an estimate because data quality objectives for accuracy (low bias) were not met
	J (King County)	Value is an estimate for a tentatively identified compound; confidence level not specified
	J (ARI)	Analyte was positively identified and detected; however, concentration is an estimated value because the result is less than the quantitation limit
	J2	Value is an estimate for a tentatively identified compound; medium-high confidence level of the analyte library match
	J3	Value is an estimate for a tentatively identified compound; low-medium confidence level of the analyte library match
	L (King County)	Value is an estimate because data quality objectives for accuracy (high bias) were not met

	Qualifier Code	Definition
	M	Estimated value of analyte found and confirmed by analyst but with low spectral match
	R	Rejected value
	X (King County)	Very biased data because of low recoveries of matrix spikes or surrogate compounds
	Y (ARI)	Indicates raised reporting limit because of background interference; compound is still not detected at or above the raised reporting limit
Validation qualifiers		
	J+ and JH	Analyte was positively identified and detected; however, concentration is probably biased high
	J- and JL	Analyte was positively identified and detected; however, concentration is probably biased low
	JK, J, and E	Analyte was positively identified and detected; however, concentration is estimate with unknown bias
	R	Result is unusable

3.2.1 King County events prior to 2002 (EPA review)

EPA reviewed QC sample results for sediment and tissue samples collected during Norfolk, Duwamish/Diagonal, and KC WQA events and analyzed by the King County Environmental Laboratory (EPA 2003). QC data types reviewed included the relative percent difference (RPD) between laboratory duplicates, matrix spike/matrix spike duplicate recoveries, laboratory control sample recoveries (spiked blanks), method blanks, and surrogate recoveries.

Approximately 8.6% of the results were qualified as estimated (J) and approximately 3.6% were qualified as unusable (R). Almost all the R qualifiers were assigned because of very low (<10%) matrix spike recoveries. Parameters qualified with an R included benzidine, 3,3′-dichlorobenzidine, aniline, 4-chloroaniline, hexachlorocyclopentadiene, and antimony. Some of the target compounds were detected in the method blanks. King County's initial validation qualified the affected sample results with a B qualifier indicating that blank contamination was present. EPA recommended that each B-qualified result be assessed to determine whether the reported concentration was less than 5X the concentration reported in the blank (10X for phthalates); such results should be qualified as not detected (U) at the concentration reported. No validation qualifiers were added for sample concentrations greater than 5X (or 10X for phthalates) the concentration in the blank.

Windward applied the validation qualifiers recommended by EPA to the results from King County events listed in Tables 3-1 and 3-2. The changes made to these results are summarized in Table 3-7, along with definitions of all qualifiers. EPA stated in their review (EPA 2003) that once the validation qualifiers are applied, all of these data, except those qualified as R, will be usable as qualified for all purposes in Phase 2. The validation qualifiers have been included in the LDW project database.

Table 3-7. Summary of data qualifier changes made to results from Phase 1 King County events based on EPA review

Result Count	Interpreted Qualifier [a]	Validation Qualifier [b]	Laboratory Qualifier [c]
363	UR	R	<MDL
6	UJ	UJ	<MDL
455	UJ	UJK	<MDL
6	J	JU	<RDL
57	BU	U	B
2			B
5	BUJ	U	BEG
24	BUJ	UJK	BEG
2	J	JK	BEG
5	BUJ	U	BG
40	BUJ	UJK	BG
1	BUJ	UJK	BU
3	J	J	E
5	UJ	U	EG
43	UJ	UJK	EG
6	UJ	U	G
1	UJ	U	J
12	JN	JN	J2
1	JN	JN	J3
14	UR	R	U
1	U	U	U
99	UJ	UJK	U
1	UR	R	UER
99	UR	R	UG
6	UR	R	UX
1	UR	R	UXE
55	J	JH	
32	J	JK	
74	J	JL	
6	UJ	UJK	

[a] Windward's interpreted qualifier is a simplified combination of the laboratory and validation qualifier. Its purpose is to standardize qualifiers across multiple events that may include codes assigned by various laboratories and validators that may not be comparable to each other. In practice, it is very similar to the validation qualifier.

[b] Assigned by the EPA QA Office (EPA 2003). See EPA's (2003) memorandum for sample-specific validation qualifiers.

[c] Originally assigned by the King County Environmental Laboratory; qualifier is unchanged for Phase 2

Laboratory and validation qualifier definitions are given in Table 3-6. Where not otherwise specified in Table 3-6, qualifiers with more than one letter are simply combinations of the definitions provided in Table 3-6 for single letters.

Interpreted qualifiers:

U = Analyte not detected at given quantitation limit

J = Concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met

UJ = Analyte not detected at given quantitation limit, which is estimated because quality control criteria were not met

R = Rejected value

B = Contamination reported in blank

JN = Analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification. Value is an estimate.

3.2.2 Boeing SiteChar (Windward review)

The 88 sediment samples collected by Exponent in 1997 were analyzed for the following analytes (analytical methods shown in parentheses): PCB Aroclors (EPA 8080, dual-column mode), SVOCs (EPA 8270), metals (EPA 6010 and 7471), and conventional parameters (PSEP 1986). Analytical Resources, Inc. (ARI) performed all laboratory analyses with the exception of particle size determination conducted by Rosa Environmental & Geotechnical Laboratory.

The laboratory QC procedures were evaluated and reviewed by Exponent (1998). Data validation was completed according to EPA functional guidelines (EPA 1994a, b) and to project-specific guidelines for methods and analyses not specifically addressed in the functional guidelines. The case narrative, chain-of-custody evaluation, and the QC data evaluation package were reviewed. Laboratory data were reviewed in terms of completeness, holding times, analytical methods, instrument performance, initial and continuing calibration, method blank concentrations, accuracy (bias and precision), analyte identification and quantitation, and method reporting limits. This review was consistent with QA1 elements (see Table 2-2), with the exception of initial and continuing calibration review, which are typically QA2 elements. Results for field duplicate samples and field blanks were evaluated to assess field precision and decontamination procedures using duplicate and equipment blank samples. The data validation results are presented in Appendix B of Exponent's data report (Exponent 1998).

The quality assurance review confirms that the laboratory met all major DQOs identified in the project-specific QAPP. Of 8,064 results reported by the laboratories, 826 results were reported as estimates (J), 2 results were restated as undetected (U), and 53 results were rejected (R) for pentachlorophenol because of poor matrix spike recoveries. Because the data validation previously conducted was based on EPA functional guidelines for data validation (EPA 1999, 2002c), LDWG believes that all data, as qualified, are suitable for use for all purposes in the Phase 2 RI/FS with the exception of the rejected pentachlorophenol data. Assigned laboratory and validation qualifiers were previously integrated into the Phase 1 database. The data report contains laboratory-generated Form 1s. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. This dataset meets the additional DQOs established for Phase 2. No additional qualifiers were added to the data from this event as part of this data review. EPA (2004) agreed with LDWG's conclusion about the acceptability of this dataset.

3.2.3 NOAA SiteChar (EPA review)

The sediment samples collected by the National Oceanic and Atmospheric Administration (NOAA) in 1997 were analyzed by NOAA for selected PCB congeners, polychlorinated triphenyls (PCTs), and PCBs+PCTs using the National Oceanic and Atmospheric Administration's (NOAA's) high-pressure liquid chromatography/photodiode array (HPLC/PDA) and gas chromatography/electron capture detection (GC/ECD, equivalent to EPA 8080) methods. Total PCBs were calculated as the difference between total PCTs, which were determined using GC/ECD) and PCBs+PCTs, which were determined using HPLC/PDA. EPA quality assurance (QA) staff reviewed the partial validation conducted by EcoChem, using the project-specific guidelines and EPA functional guidelines for data validation (EPA 1999, 2002c). Using the case narrative and QC summary packages, the following QC data were reviewed by EcoChem: initial and continuing calibration, method blanks, surrogate recoveries, standard reference material (SRM) recoveries, replicates, target analyte lists, and method detection limits. In EcoChem's review, 878 congener results were qualified as estimated because of potential high bias from the presence of coeluting compounds. Congener data were also qualified because of method blank contamination and because of concentrations reported below the method detection limit. However, because the QC results were not reported in the validation reports, EPA staff could not verify the validation report conclusions.

EPA QA staff recently conducted additional validation of this dataset (Araki 2004), focusing on the following elements: initial calibration, quantitation, response and detection, unknown PCBs, combined uncertainty, precision, and accuracy. EPA (Araki 2004) concluded that:

- All data generated by the NOAA HPLC/PDA method for total PCBs in sediments were considered usable for the purposes of determining the distribution pattern of chemicals in sediment.
- All results will have a measurement uncertainty that will be greater than similar results generated by GC/ECD (EPA method 8082)
- The data could be used for risk assessment and delineating cleanup areas, after incorporating EPA's qualifier code recommendations in the LDW project database, as shown below:
  - Results that are less than 100 µg/kg are considered estimates and should be "JL" qualified because they may have a large potential negative bias (i.e., PCB concentrations may be underestimated)

- Results that are greater than 600 µg/kg are considered estimates and should be "JH" qualified because they may have a potential positive bias (i.e., PCB concentrations may be overestimated)
- Results between 100 and 600 µg/kg are considered usable without qualification. However, there is still a potential positive bias which may be associated with these results and cannot be confirmed.

EPA recommended that potential bias for total PCBs should be discussed in the uncertainty sections of the risk assessments (Araki 2004). It should be noted that the data do not meet all three additional DQOs established for Phase 2. Specifically, laboratory-generated Form 1s were not available for review.

During the Phase 1 RI, EPA concluded that the individual congener data generated from the NOAA study were not acceptable for risk characterization in Phase 2, because detection limits were high and the congener concentrations are screening-level-only based on the method limitations.

3.2.4 Seaboard (Windward review)

A QA review of the 22 sediment samples collected by Herrera Environmental Consultants (Herrera) in 1996 at the Seaboard Lumber site was originally completed by Herrera (Herrera 1997). Sediment samples were analyzed for 10 metals (EPA 6010, 7060, 7421, 7471), SVOCs (EPA 8270), PCBs and hexachlorobenzene (EPA 8082, dual-column mode), total organic carbon (PSEP 1986), total solids (PSEP 1986), pH (EPA 9045C), and grain size (PSEP 1986) by ARI. The usefulness of the data was assessed based on criteria from EPA laboratory functional guidelines (EPA 1994a, b). Using the QC reports prepared by ARI, the following measures were considered in the data validation: holding times, method blanks, instrument performance check (SVOCs and PCBs only), initial and continuing calibration, preparation and field blanks, ICP analysis (metals only), laboratory control samples, duplicates, matrix spike and matrix spike duplicates, graphite furnaces atomic absorption (metals only), SRM, and ICP serial dilution (metals only). This review was consistent with QA2, as described in Table 2-2.

All PCBs, hexachlorobenzene, SVOCs, and physical analysis data were deemed acceptable by the data validators without any qualifiers. Some metals were given qualifiers, and the only results qualified as "R" (rejected) were for antimony based on percent spike recoveries outside the acceptable range. Because the data validation previously conducted was based on EPA functional guidelines for data validation (EPA 1994a, b), LDWG believes that all data, as qualified, are suitable for use for all purposes in the Phase 2 RI/FS with the exception of the rejected antimony data. Assigned laboratory and validation qualifiers were already integrated into the Phase 1 database.

EPA (2004) generally agreed with Windward's conclusion about the acceptability of this dataset, but had additional questions about Y-qualified PCB data. EPA wanted a definition for the Y qualifier and a discussion of how the qualifier affected data usability. The Y qualifier is defined by ARI, the laboratory that conducted the analysis, as: "indicates raised reporting limit due to background interference; compound is still not detected at or above the raised limit." For PCB analyses, this higher reporting limit is often caused by coeluting DDD/DDE/DDT compounds. Pesticides were not analyzed in any of the Seaboard sediment samples, so the magnitude of any potential coelution is unknown. The Y-qualified Aroclor data are shown below. In each case, other Aroclors were detected at concentrations at least 2X the Y-qualified Aroclor, indicating that the total PCB concentration is suitable for all uses.

- Sample SD-12 – Aroclor 1248 = 2.67 µg/kg dw Y (total PCBs calculated as 9.95 µg/kg dw)
- Sample SD-15 – Aroclor 1254 = 1.31 µg/kg dw Y (total PCBs calculated as 2.62 µg/kg dw)
- Sample SD-16 – Aroclor 1254 = 7.47 µg/kg dw Y (total PCBs calculated as 35.88 µg/kg dw)

Windward and EPA discussed the Y-qualified data at a meeting on February 12, 2004. During that meeting, EPA questioned the appropriateness of the assumption that Windward made in the LDW project database that a Y qualifier is equivalent to a U qualifier. The scenario discussed was a Y-qualified Aroclor or DDD/DDE/DDT result that was higher than any detected Aroclor or DDD/DDE/DDT result for the same sample. In this scenario, it may not be appropriate to assume that no detectable concentration of Aroclor or DDD/DDE/DDT was present. Windward reviewed the application of the Y qualifier for the Seaboard event and all other LDW events in the LDW project database, and confirmed that such a scenario has not occurred for any of the events evaluated to date for the LDW RI. Consequently, no change to the mapping of the Y laboratory qualifier to a U interpreted qualifier was made based on Windward's review.

With this clarification, Windward's review indicates that all the sediment results for the Seaboard event, with the exception of R-qualified antimony data, are acceptable for all uses in Phase 2. No other validation qualifiers were added to the database as part of Windward's review.

3.2.5 Rhône-Poulenc (Windward review)

Sediment chemistry data collected in 1994 during the Rhône-Poulenc RCRA Facility Investigation (RFI) Rounds 1 and 2 were validated by CH2M Hill and summarized in the RFI report (Rhône-Poulenc 1995). Samples were analyzed by ARI for SVOCs (EPA 8270), pesticides and PCBs (EPA 8080, dual-column mode), and metals (EPA 6010, 7060, 7471). Sediment physical property analyses were performed by Soil Technology Laboratory using PSEP methods.

Round 1 sediment samples underwent a summary data validation, but the raw data (i.e., Form 1s) are not available. Consequently, these Round 1 data are not considered acceptable for all uses in Phase 2. Round 2 sediment samples underwent a full data validation review (i.e., QA2) consistent with EPA functional guidelines (EPA 1994a, b) including a review of QC summary forms and raw data checks, and qualification flags were assigned based on protocol deviations. Analytical laboratory reports were reviewed according to EPA functional guidelines. Sample preparation, instrument parameters, detection limits, accuracy, precision, and completeness were all considered in the QC review. Analyses of field QA/QC samples were conducted to assess variation and precision in the overall methodology used and potential contamination in field or laboratory equipment.

All of the Round 2 sediment data met the project statement of work requirements. The only data qualifier applied to these data was U for undetected. Because the data validation previously conducted was based on EPA functional guidelines for data validation (EPA 1994a, b), LDWG believes that all data, as qualified, are suitable for use for all purposes in the Phase 2 RI/FS. Assigned laboratory qualifiers were already integrated into the Phase 1 database. No validation qualifiers were included in the original electronic dataset, nor were any added as part of Windward's review. EPA (2004) concluded Round 2 data, as qualified, were suitable for all uses in Phase 2.

3.2.6 PSAMP-fish (Windward review)

Under the Puget Sound Ambient Monitoring Program (PSAMP), English sole skinless fillet samples were collected by the Washington Department of Fisheries and analyzed by the King County Environmental Laboratory in 1992, 1995, and 1997. Each sampling event included three samples from the LDW. In 1992, skinless fillet samples were assayed for the full PSAMP target compound list including metals (EPA 6010, 7421, 7471), pesticides and PCBs (EPA 8080, dual-column mode), and SVOCs (EPA 8270). In 1995 and 1997 skinless fillet samples were analyzed for pesticides, PCBs, and a smaller number of metals by the same methods used in 1992. All three datasets were reviewed by Dr. David Kalman (University of Washington) and evaluated for compliance with analytical requirements and data quality objectives (Kalman 1994, 1996, 1997, 1999). Adult salmon data listed in Table 3-2 were not reviewed because these data will not be used in the Phase 2 risk assessments.

All three datasets were deemed adequate to permit data validation. Using the QC summary package, the following QC elements were reviewed by Dr. Kalman: detection limits, precision, blanks, spike blanks, calibration checks, replicate samples, matrix spikes, SRM, and surrogate recoveries. QC performance requirements were based on the guidelines specified in the project-specific contract, PSEP documents, or EPA Contract Laboratory Program documents, in that order of preference.

In the 1992 English sole PSAMP dataset, Dr. Kalman assigned qualifiers ("U" non-detected, "E" estimated, and "R" rejected). Phthalates were assigned qualifiers based on method blanks and several results were rejected because of poor spiked recovery results. In the QA review of the 1995 English sole PSAMP dataset, all data were considered well supported by QC results and suitable for use as qualified (some "E" estimated qualifiers were assigned). All metals and pesticide data in the 1997 English sole PSAMP QA review were deemed usable without qualifiers. Several "E" qualifiers were assigned to Aroclor results based on spiked recoveries or matrix spike samples. The "E" validation qualifiers from the 1992, 1995, and 1997 events were changed to "JK" (estimated concentration; unknown bias) to be consistent with EPA data validation guidelines (EPA 1999, 2002c). Because the data validation previously conducted was consistent with EPA functional guidelines for data validation, LDWG believes that all data, as qualified, are suitable for use for all purposes in the Phase 2 RI/FS with the exception of the rejected results. These assigned laboratory and validation qualifiers were already integrated in the Phase 1 dataset.

EPA (2004) responded to Windward's conclusion with additional requests, which are repeated below with Windward's response.

- **EPA request:** Provide additional information on the method used for PCB analyses and identification.
  Windward response: PCB analyses and identification were conducted using dual column gas chromatography/electron capture detection (GC/ECD).

- **EPA request:** Check if the hand-written corrections on the validation reports were incorporated in the data reported.
  Windward response: All hand-corrected concentrations have been incorporated into the LDW project database, with the exception of corrections for LDW 1992 samples for bis(2-ethylhexyl)phthalate and di-n-butylphthalate based on blank contamination. These corrections were intended to blank-correct the sample concentrations, which is contrary to the policy in effect for the LDW RI (i.e., blank correction is inappropriate). The meaning of the hand-written notation on the cover of the draft 1997 data validation report (i.e., "PCB data incorrect") was further investigated. The notation added by the validators led to reanalysis of some of the samples from the 1997 event, but the three LDW samples were not reanalyzed. Therefore, the notation does not apply to LDW data. The updated results and validation were presented in Kalman (1999).

- **EPA request:** Ensure that data qualifier definitions are included in the validation reports.
  Windward response: Laboratory qualifiers other than <MDL and <RDL were not added to any of the LDW samples. The qualifier <MDL was mapped to an interpreted qualifier of U in the LDW project database. No interpreted qualifier was added for the laboratory qualifier <RDL.

Based on the resolution of EPA's outstanding questions from their January 2004 memo EPA (2004) and Windward's (2003a) conclusions about data quality for these events, the 1992, 1995, and 1997 English sole data should be acceptable for all uses in Phase 2.

3.2.7 DSOAvertchar2 (Windward review)

Twenty-eight subsurface sediment samples were collected off Boeing Plant 2 on August 12-20, 2003 by MCS Environmental and analyzed by ARI for total solids (EPA 160.3), TOC (Plumb 1981), and PCBs (EPA 8082 in dual-column mode). Sayler Data Solutions performed a summary data validation on the results using EPA functional guidelines for data validation (EPA 1999). The original electronic dataset had only a single field for qualifiers, so no distinction was made between laboratory and validation qualifiers.

Five individual Aroclor results were qualified as estimates (J) by the validators because the RPDs between field duplicate results were greater than 50%. One Aroclor result was qualified by the validators as an estimate because the RPD between the dual-column concentrations differed by more than 40%. Four individual Aroclor concentrations were qualified by the laboratory because the detected concentration was less than the reporting limit. Three TOC results were qualified by the validator as estimates because the RPDs between field duplicate results were greater than 20%. Windward mapped the J qualifier to a JK validation qualifier (estimate with unknown bias). These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.8 Norfolk-monit7 (Windward review)

Eight surface sediment samples were collected in the vicinity of the Norfolk combined sewer overflow (CSO) on April 5, 2004 by King County. The samples were analyzed for conventional parameters (EPA 9060, SM 2540-G, ASTM D422), metals (EPA 6010B, EPA 245.5), SVOCs (EPA 8270C), and PCBs (EPA 8082 in dual-column mode). King County Environmental Laboratory conducted all analyses except for grain size distribution, which was analyzed by AmTest. All analytical data and laboratory QC procedures were evaluated and reviewed by King County following QA1 guidelines (PTI 1989).

The method blank had detectable concentrations of bis(2-ethylhexyl)phthalate (7.0 µg/kg dw) and benzoic acid (43 µg/kg dw), and all sample results for these two compounds were qualified B by the laboratory to indicate blank contamination. All benzoic acid concentrations were qualified as part of Windward's review as undetected as a result of blank contamination (BU) because the sample concentrations were less than 10x the blank concentration. Four of the eight bis(2-ethylhexyl)phthalate concentrations were similarly qualified because of blank contamination.

All results for benzo(a)anthracene, chrysene, pyrene, benzo(k)fluoranthene, and benzo(a)pyrene were qualified E by the laboratory because the RPDs between laboratory duplicate analyses exceeded laboratory guidelines. This laboratory qualifier was mapped to a validation qualifier of JK (estimated concentration; unknown bias).

Approximately 25 results for several SVOCs were qualified by the laboratory as G because percent recoveries for matrix spikes or SRMs were below laboratory guidelines. This laboratory qualifier was mapped to a validation qualifier of JL (estimated concentration; low bias).

Five results for Aroclor 1254, and all results for aluminum and silver were qualified L because percent recovery for matrix spikes or SRMs were above laboratory guidelines. This laboratory qualifier was mapped to a validation qualifier of JH (estimated concentration; high bias).

Six semivolatile organic compounds (2,4-dimethylphenol, 3,3'-dichlorobenzene, aniline, 4-chloroaniline, 3-nitroaniline, pyridine), all of which were undetected, were qualified by the laboratory with an X, indicating <15% matrix spike recovery. These results were assigned an R validation qualifier (rejected value) as part of Windward's review. These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. LDWG believes that all data, as qualified, are suitable for use for all purposes in Phase 2, with the exception of the rejected values.

3.2.9 DuwDiag-DredgeMonitoring (Windward review)

Surface sediment samples were collected at 12 locations in the vicinity of the Duwamish/Diagonal early action site by King County on October 20-21, 2003, prior to remediation activities, and on March 29-30, 2004, after remediation activities were completed. The 24 samples were analyzed for conventional parameters (EPA 9060, SM 2540-G, ASTM D422), metals (EPA 6010B, EPA 245.5), SVOCs (EPA 8270C), pesticides (EPA 8081A), and PCBs (EPA 8082 in dual-column mode). King County Environmental Laboratory conducted all analyses except for grain size distribution, which was analyzed by AmTest. All analytical data and laboratory QC procedures were evaluated and reviewed by King County following QA1 guidelines (PTI 1989).

The method blank associated with the pre-dredge sampling event had detectable concentrations of bis(2-ethylhexyl)phthalate (8.4 µg/kg dw); associated sample results for this compound were qualified B by the laboratory to indicate blank contamination. All field samples had bis(2-ethylhexyl)phthalate concentrations more than 10x the blank concentration, so no validation qualifiers were required.

All results for mercury from the post-dredge monitoring were qualified E or UE by the laboratory because the RPD between laboratory duplicate analyses exceeded laboratory guidelines. These laboratory qualifiers were mapped to validation qualifiers of JK (estimated concentration; unknown bias) and UJK (estimated detection limit; unknown bias), respectively.

Eight detected results for phenanthrene from the pre-dredge monitoring were qualified EGL by the laboratory because the RPD between laboratory duplicate analyses exceeded laboratory guidelines (E qualifier), the measured concentration in the SRM sample was less than laboratory QC limits (G qualifier), and the matrix spike recovery was higher than the laboratory QC limit (L qualifier). This combination laboratory qualifier was mapped to a validation qualifier of JK (estimated concentration; unknown bias).

Seventy-one detected results for anthracene, phenanthrene, pyrene, benzo(g,h,i)perylene, benzoic acid, and iron and 223 undetected results for 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,4-dimethylphenol, 2-chlorophenol, 2-methylphenol, 2-nitrophenol, 4-methylphenol, anthracene, antimony, benzo(g,h,i)perylene, benzoic acid, benzyl alcohol, beta-BHC, bis(2-chloroethyl)ether, coprostanol, endrin aldehyde, naphthalene, pentachlorophenol, phenanthrene, phenol, pyrene, and pyridine were qualified G and UG, respectively, by the laboratory because the measured concentration in the SRM sample or the matrix spike recovery was less than laboratory QC limits. These laboratory qualifiers were mapped to validation qualifiers of JL (estimated concentration; low bias) and UJL (estimated detection limit; low bias), respectively.

One hundred ten detected results for 4,4′-DDE, alpha-chlordane, aluminum, arsenic, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, pyrene, and silver were qualified L by the laboratory because the measured concentration in the SRM sample or the matrix spike recovery was higher than laboratory QC limits. This laboratory qualifier was mapped to a validation qualifier of JH (estimated concentration; high bias).

Thirteen undetected results for 2,4-dimethylphenol, 4-methylphenol, beta-BHC, and endrin aldehyde were qualified UGL by the laboratory because the measured concentration in the SRM sample was less than laboratory QC limits (G qualifier), and the matrix spike recovery was higher than the laboratory QC limit (L qualifier). This combination laboratory qualifier was mapped to a validation qualifier of UJK (estimated detection limit; unknown bias).

Sixty-seven undetected results for 2,4-dimethylphenol, 4,4′-DDD, 4,4′-DDT, 4-methylphenol, aldrin, alpha-BHC, alpha-chlordane, alpha-endosulfan, Aroclor-1016, Aroclor-1260, beta-endosulfan, delta-BHC, dibenzo(a,h)anthracene, dieldrin, endosulfan sulfate, endrin, gamma-BHC, gamma-chlordane, heptachlor, heptachlor epoxide, methoxychlor, and toxaphene were qualified UL by the laboratory because the measured concentration in the SRM sample or the matrix spike recovery was higher than laboratory QC limits. This laboratory qualifier was mapped to a validation qualifier of UJH (estimated detection limit; high bias).

All undetected results for aniline (there were no detected concentrations) were qualified UX, indicating <10% matrix spike recovery. These results were assigned a UR validation qualifier (rejected value) as part of Windward's review. These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. LDWG believes that all data, as qualified, are suitable for use for all purposes in Phase 2, with the exception of the rejected values.

3.2.10 Norfolk-monit6 (Windward review)

Eight surface sediment samples were collected in the vicinity of the Norfolk CSO on April 23, 2003 by King County. The samples were analyzed for conventional parameters (EPA 9060, SM 2540-G, ASTM D422), metals (EPA 6010B, EPA 245.5), SVOCs (EPA 8270C), and PCBs (EPA 8082 in dual-column mode). King County Environmental Laboratory conducted all analyses except for grain size distribution, which was analyzed by AmTest. All analytical data and laboratory QC procedures were evaluated and reviewed by King County following QA1 guidelines (PTI 1989).

Aluminum results for this dataset were qualified L because of high matrix spike recovery. Benzo(k)fluoranthene results for this dataset were also qualified L because of SRM or matrix spike recoveries above acceptable QA limits. Windward mapped this laboratory qualifier to a JH validation qualifier (estimated concentration, high bias). Iron results for this dataset were qualified G because of low matrix spike recovery (22%). Naphthalene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene, hexachlorocyclopentadiene, 2-methylphenol, 4-methylphenol, and 4-nitroanaline results were qualified G because of SRM or matrix spike recoveries below acceptable QA limits. Windward mapped this laboratory qualifier to JL (estimated concentration, low bias).

One method blank had detected concentrations for three phthalates. Because the associated phthalate concentrations in the samples associated with this method blank were less than 10X the concentrations detected in the blank, the results were qualified as BU. Results for the 2,4-dimethylphenol, 3,3'-dichlorobenzidine, aniline, 4-chloroanaline, and 3-nitroanaline were qualified X because of very low matrix spike recoveries. Windward mapped this laboratory qualifier to an R validation qualifier (rejected value). The gravel and clay portions of the grain size particle distribution analysis were qualified E because of a %RSD greater than 20% for the laboratory replicate sample. Windward mapped this laboratory qualifier to JK (estimate with unknown bias). These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2, with the exception of the rejected values.

3.2.11 Turning-basin (Windward review)

Anchor Environmental collected 5 subsurface sediment samples in the upper turning basin on June 26, 2003. The samples were analyzed by Columbia Analytical Services, Inc. (CAS) for conventional parameters (EPA 160.3, EPA 160.4, Plumb 1981, PSEP 1986), PCBs (EPA 8082 in dual-column mode), pesticides (EPA 8081A), SVOCs (EPA 8270C), VOCs (EPA 8260B), and metals (EPA 200.8, EPA 6020, EPA 7471). Anchor validated the data using EPA (1999; 2002c) functional guidelines and determined that all data were acceptable. The original electronic dataset had only a single field for qualifiers, so no distinction was made between laboratory and validation qualifiers.

The metals laboratory method blank had low detected concentrations of antimony, chromium, and zinc. Chromium and zinc concentrations in the associated field samples were well above 10X the concentrations detected in the blank, so no qualification was necessary. Antimony concentrations were less than 5X the concentration in the blank, so all results were qualified as U. The SVOC blank had detections of phenol and bis(2-ethylhexyl)phthalate, so results within 10X the blank concentration were qualified BU. All results for antimony were qualified J- (estimated concentration; low bias) because of low percent recovery of antimony in the matrix spike. Three of the SVOC matrix spike percent recoveries and four of the MSD percent recoveries were below the laboratory control limits. The associated SVOCs were qualified as J-. Windward mapped this laboratory qualifier to JL (estimated concentration, low bias). The sulfide matrix spike recovery (301%) was well above control limits, indicating a potential high bias for sulfide results. All sulfide results were assigned a validation qualifier of JH (estimated concentration, high bias). These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.12 Plant2-TransformerPhase1 (Windward review)

Subsurface (46 samples) and surface (5 samples) sediment samples were collected by Floyd, Snider, McCarthy off the southwest corner of Boeing Plant 2 on August 20-22, 2003 (subsurface) and September 9 and 12, 2003 (surface) and analyzed by ARI for total solids (EPA 160.3), grain size (PSEP 1986), TOC (Plumb 1981), and PCBs (EPA 8082 in dual-column mode). Sayler Data Solutions performed a summary data validation on the results using EPA functional guidelines (EPA 1999). The original electronic dataset had only a single field for qualifiers, so no distinction was made between laboratory and validation qualifiers.

One Aroclor 1260 result was qualified as an estimate (J) because the RPD between field duplicate results was greater than 50%. Four Aroclor 1260 results were qualified as estimates because the RPD between the dual-column concentrations differed by more than 40%. Three TOC results were qualified as estimates because the RPDs between field duplicate results were greater than 20%. All coarse silt results were qualified J because field duplicate results were greater than 50%. Windward mapped the J qualifier to a JK validation qualifier (estimate with unknown bias).

Thirty-seven Aroclor results were qualified by the laboratory as Y, indicating a raised reporting limit as a result of background interference. These results were qualified as undetected during Windward's review, in accordance with qualifier code map used for this project. These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.13 Ecology-Norfolk (Windward review)

Twenty-one surface sediment samples were collected by Ecology in the vicinity of the Norfolk CSO on July 9, 2002. The samples were analyzed by the EPA/Ecology Manchester Laboratory for TOC (EPA 415.1), grain size (PSEP 1986), and PCBs (EPA 8082 in dual-column mode). All analytical data and laboratory QC procedures were evaluated and reviewed by Ecology following QA1 guidelines (PTI 1989). Overall, results from laboratory QC evaluations were acceptable and within established laboratory QC limits, with some minor exceptions.

All field samples contained a mixture of Aroclors 1248 and 1254, with one exception (Sample 02288150 contained a mixture of Aroclors 1248 and 1260). PCB concentrations were quantified based on the standard Aroclor GC pattern the samples most closely resembled, and the concentration of the second Aroclor in the sample was not quantified. Because the mixture of Aroclors 1248 and 1254 could not be resolved, the samples were qualified J (estimated concentration). Windward mapped the J qualifier to a JK validation qualifier (estimate with unknown bias). These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during this review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.14 Norfolk-monit5 (Windward review)

Eight surface sediment samples were collected in the vicinity of the Norfolk CSO on April 30, 2002 by King County. The samples were analyzed for conventional parameters (EPA 9060, SM 2540-G, ASTM D422), metals (EPA 6010B, EPA 245.5), SVOCs (EPA 8270C), and PCBs (EPA 8082 in dual-column mode). King County Environmental Laboratory conducted all analyses except for grain size distribution, which was analyzed by AmTest. All analytical data and laboratory QC procedures were evaluated and reviewed by King County following QA1 guidelines (PTI 1989).

Aluminum results for this dataset were qualified L because of high matrix spike recovery. Windward mapped this laboratory qualifier to a JH validation qualifier (estimated concentration; high bias). Iron results for this dataset were qualified G because of low matrix spike recovery. Naphthalene, anthracene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene, 2,4-dimethylphenol, and aniline results were qualified G because of SRM or matrix spike recoveries outside of acceptable QA limits. Windward mapped this laboratory qualifier to a JL validation qualifier (estimated concentration; low bias).

One method blank had detected concentrations of 1,4-dichlorobenzene (0.56 µg/kg dw), bis(2-ethylhexyl)phthalate (53.4 µg/kg dw), and butyl benzyl phthalate (18 µg/kg dw). Results for these parameters in the associated samples were qualified by the laboratory with B (contamination reported in blank). Most of the 1,4-dichlorobenzene results in the field samples were less than 5X the concentration detected in the blank; these results were assigned the validation qualifier of BU (not detected as a result of contamination in blank). Most of the bis(2-ethylhexyl)phthalate concentrations were detected in field samples at concentrations greater than 10X the concentration detected in the blank; those that were not were assigned a validation qualifier of BU. None of the butyl benzyl phthalate concentrations were detected at concentrations greater than 10X the blank concentration, so all field results were given BU qualifiers.

All Aroclor 1260 results were qualified as E because of high RPD in laboratory replicate samples. The gravel and clay portions of the grain size particle distribution analysis were qualified E because of a %RSD greater than 20% in the laboratory replicate sample. Windward mapped this laboratory qualifier to JK (estimate with unknown bias). These validation qualifiers were incorporated into the electronic data. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.15 DSOAvertchar (Windward review)

Pentec Environmental collected 125 sediment core samples off Boeing Plant 2 between June 4 and 19, 2001. All samples were analyzed by ARI for PCBs (EPA 8082) and TOC (EPA 9060) and a subset of 29 samples was analyzed for metals (EPA 6010). Pentec performed a QA1 data quality review (PTI 1989) and determined that all data were acceptable for use with qualifiers. The original electronic dataset had only a single field for qualifiers, so no distinction was made between laboratory and validation qualifiers.

Aroclor results for two samples were qualified J because of low surrogate recoveries. These validation qualifiers were changed to JL (estimated concentration, low bias). Aroclor 1248 results for two other samples were qualified with Y by the laboratory (indicates raised reporting limit as a result of background interference; compound is still not detected at or above the raised limit) and UM (non-detected, but matrix effect present) by the validator. This combination of qualifiers was treated as a non-detect and Aroclor 1248 was not included in the total PCB calculation for these samples. One Aroclor-1232 concentration was also Y-flagged by the laboratory, but the data validator qualified the result as JM (estimated concentration as a result of matrix effect) because chromatographic peaks in the area of interest were present. Consequently, the Aroclor-1232 concentration in this sample was treated as a detection and included in the total PCB calculation. The relative standard deviation for triplicate analysis of Aroclor 1260 concentration in one sample was greater than 50% in one sample. This result was qualified J by the validator. This validation qualifier was changed to JK (unknown bias) as part of Windward's review.

One sample analyzed for zinc and another analyzed for chromium were qualified J because of matrix spike recoveries outside of control limits. The percent recoveries were above and below the control limits for zinc and chromium, respectively, so the validation qualifiers for these results were changed to JH (estimated concentration; high bias) and JL (estimated concentration; low bias), respectively. Laboratory metals duplicate RPDs for one sample were outside control limits and the applicable sample results were qualified J. A validation qualifier of JK (unknown bias) was assigned to these results. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

These validation qualifiers were incorporated into the LDW project database. Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.16 JamesHardieOutfall (Windward review)

Nine surface sediment samples were collected by Roy F. Weston Inc. (Weston) on June 3, 2000. These samples were analyzed by CAS for conventional parameters (PSEP 1986), SVOCs (EPA 8270-SIM), metals (EPA 200.8), and PCBs (EPA 8082). The following QC data were reviewed by Weston: initial and continuing calibration, method blanks, surrogate recoveries, SRM recoveries, replicates, target analyte lists, and method detection limits. The quality assurance review confirms that the laboratory met all major DQOs identified in the project-specific QAPP. The original electronic data had only a single field for qualifiers, so no distinction was made between laboratory and validation qualifiers.

1,2,4-Trichlorobenzene was detected in a laboratory method blank at 2.0 µg/kg. 1,2,4-Trichlorobenzene results were qualified BU when the sample concentration was less than five times the concentration detected in the blank. One result was qualified in this manner. No other validation qualifiers, other than U (undetected), were added. These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.17 PSDDA99 (Windward review)

Striplin Environmental Associates (SEA) collected 20 subsurface sediment samples in the navigation channel between RM 1.9 and 3.4 between August 23 and 27, 1999. The sediment samples were analyzed by ARI for conventional parameters (Plumb 1981, PSEP 1986, SM 5310B, pesticides (EPA 8081), PCBs (EPA 8082), SVOCs (EPA 8270), VOCs (EPA 8260), and metals (EPA 6010, 7041, 7060A, 7131A, 7471, 7761. Tributyltin (TBT) was also analyzed by EPA 8270-SIM in porewater collected from these sediment samples. Three of the sediment samples were also analyzed for PCB congeners by Axys Analytical Services using EPA Method 1668. SEA conducted a data quality evaluation following PSDDA QA1 evaluation guidelines (PTI 1989) and determined that all data were acceptable. The original electronic dataset had only a single field for qualifiers, so no distinction was made between laboratory and validation qualifiers.

Sixteen of these sediment samples were not analyzed for TOC within the specified holding time and were given J qualifiers. These were mapped to JK validation qualifiers (estimated concentration, unknown bias). Antimony results for this dataset were qualified by the data validator with UJ (non-detect with estimated reporting limit) because of a low (<25%) matrix spike recovery. The non-detected antimony results were assigned R (unusable) validation qualifiers to be consistent with EPA's functional guidelines (EPA 2002c). There were no detected antimony results. Sixteen TBT results were qualified with either M (estimated value of analyte found and confirmed by analyst but with low spectral match) or MJ (indicates an estimated value of analyte found and confirmed by analyst but with low spectral match; reported value is less than calculated detection limit). Validation qualifiers for these TBT results were mapped to JK validation qualifiers. SVOCs for one sample were qualified J or UJ because of holding time exceedances. These qualifiers were mapped to JK or UJK validation qualifiers, respectively. Eight SVOC results and one result for PCB 169 were qualified J by the laboratory, indicating a detected concentration below the calculated reporting limit. This laboratory qualifier was mapped to a JK validation qualifier. Some of the detected single-component pesticides (DDD, DDE, DDT, dieldrin and gamma-chlordane) had Y flags, as a result of co-elution with PCB peaks. PCBs were reported positive in all samples, and in all cases, the concentrations of PCBs reported are higher than the pesticide concentrations; therefore the Y flags will be considered non-detects (U qualifier). These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.18 PSDDA98 (Windward review)

SEA collected ten composite subsurface sediment samples in the navigation channel between RM 3.5 and 4.6 on October 5 and 6, 1998. These sediment samples were analyzed by ARI for conventional parameters (Plumb 1981, PSEP 1986, SM 5310B), SVOCs (EPA 8270), VOCs (EPA 8260), pesticides (EPA 8081), PCBs (EPA 8082), and metals (EPA 6010, 7041, 7060A, 7131A, 7471, 7761). TBT was also analyzed (EPA 8270-SIM) in porewater collected from these sediment samples. SEA conducted a data quality evaluation following PSDDA QA1 evaluation guidelines (PTI 1989) and determined that all data were acceptable. No data qualifiers other than U (undetected) were added to the results; consequently, no validation qualifiers need to be added to this dataset. Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.19 DuwamishShipyard (Windward review)

Five surface sediment samples were collected in the vicinity of Duwamish Shipyard in 1993 by Hart Crowser and were analyzed for metals (EPA 6010, 7060, 7421, 7471, 7740, 7841), conventional parameters (i.e., total inorganic carbon [TOC] by SM 5310-B and grain size by PSEP 1986), SVOCs (EPA 8270), and butyltins (GC/FPD). ARI conducted the analysis for metals, conventional parameters, and SVOCs. Hart Crowser performed grain size analysis, and Battelle Northwest Marine Sciences Laboratory performed the butyltin analysis.

The laboratory QC procedures were evaluated and reviewed by Hart Crowser. Data validation consistent with PSDDA guidelines (PTI 1989) for a QA1 review was completed and included a review of the holding times, surrogate spike recoveries, MS/MSDs, field duplicate results (metals, SVOCs and TOC only), method blanks, detection limits, and SRMs (metals only). The quality assurance review confirms that the laboratory met all major DQOs identified in the project-specific QAPP. The original electronic dataset had only a single field for qualifiers, so no distinction was made between laboratory and validation qualifiers. All copper, lead, and zinc results were qualified J (estimated concentration) by the validator because of high % RPD results for laboratory duplicates. Butyltin results were qualified J because of elevated butyltin concentrations in the samples (and subsequent dilution requirements), as well as matrix spike recoveries outside laboratory control limits. These J qualifiers were mapped to JK validation qualifiers (estimated concentration; unknown bias) to be consistent with EPA data validation guidelines (EPA 1999, 2002c). Antimony results for this dataset were qualified J because matrix spike and SRM recoveries were less than QAPP-specified data quality indicators (DQIs). These J qualifiers were mapped to JL validation qualifiers (estimated concentration; low bias). Nineteen SVOC results were qualified J by the laboratory, indicating a detected concentration below the reporting limit. These J laboratory qualifiers were mapped to a JK validation qualifier. These validation qualifiers were incorporated into the LDW project database. The sample-specific qualifier changes identified during Windward's review are shown in Appendix B.

Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.2.20 EW-Salmon (Windward review)

Windward collected 12 composite juvenile chinook salmon tissue samples in June 2002. The samples were analyzed for mercury (EPA 7471) by ARI and for PCBs (subset of congeners) by EPA 1668A (dual-column mode) by Axys. Aroclor formulation and concentrations were determined by Axys by quantifying and summing specific PCB congeners, characteristic of the Aroclor formulation, and multiplying by an empirically determined quantification factor. Windward conducted a QA1 data validation on these results as part of this technical memorandum.

All samples were analyzed within applicable holding times. No target analytes were detected in method blanks analyzed by either laboratory. Accuracy was assessed by reviewing the results from matrix spikes (mercury), laboratory control standards (mercury), recovery of labeled internal standards (PCBs), and ongoing precision and recovery (OPR) samples (PCBs). The percent recoveries for mercury in the matrix spike and laboratory control standard samples were 110 and 100%, respectively, indicating acceptable accuracy. The percent recoveries of labeled standards and PCB congeners in the OPR samples were 55-95% for all samples, well within the control limits of 40-120%.

Precision was assessed by reviewing the results of laboratory duplicate analyses. The RPDs for mercury and total PCBs (as Aroclors) were 3.8 and 0.50%, respectively, indicating acceptable precision.

No data qualifiers, other than U, were added to the results; consequently, no validation qualifiers need to be added to the LDW project database. Form 1s were reviewed and found to be acceptable. The results and qualifiers on the Form 1s were compared to the corresponding electronic data; no discrepancies were noted. The results from this event should be usable for all purposes in Phase 2.

3.3 Potential Uses for Datasets Not Reviewed or Not Considered Acceptable For All Uses in Phase 2

In Phase 2, chemistry data will ultimately be used to calculate risk estimates and determine risk-based goals. Data that will be used directly for such purposes must meet all DQOs, and be considered acceptable for all uses. As summarized in Tables 3-4 and 3-5, there are several historical LDW chemistry datasets that may not be appropriate for all uses in Phase 2. There may be some uses, however, that are appropriate for such datasets.

The primary use for datasets not considered acceptable for all uses is to scope additional data collection efforts. For example, if a sediment sample in a particular location indicated a low level of contamination, but was collected during an historical event that was not considered acceptable for all uses, those results would not be included in risk calculations for Phase 2. However, when designing the surface sediment sampling program, the results from that sample would suggest that an additional sample at or near that location may not be warranted. On the other hand, if the results of that sample showed elevated chemical concentrations, confirmatory sampling during Phase 2 might be appropriate.

The PCB sediment data collected by NOAA in 1997 warrant additional explanation because of the large number of samples (> 300) included in that investigation (NOAA

1998). Because the investigation focused only on PCBs,[1] these data clearly cannot be used to characterize the nature and extent of contamination for chemicals other than PCBs. Additional sampling planned for Phase 2 at some locations previously sampled during the NOAA investigation will include analysis for all Sediment Management Standards chemicals. The NOAA PCB data included estimates of total PCBs and analyses of selected PCB congeners. EPA (2003) has concluded, and LDWG agrees, that the PCB congener data should not be used for risk calculations because the detection limits were not sufficiently low to meet risk-based goals. The total PCB data, however, should be suitable for all uses in Phase 2, within the limitations associated with the data qualifiers described in Section 3.2.3.

4.0 Summary

A large amount of sediment and tissue chemistry data have been collected over the last 14 years in the LDW. Most of these data were reviewed and included in the Phase 1 RI report (Windward 2003b), as summarized in Tables 3-1 and 3-2. Additional sediment and tissue chemistry data collected since the Phase 1 RI database was finalized, or not discovered during Phase 1 data compilation, are summarized in Table 3-3. The 63 datasets, representing 2,293 sediment and tissue samples, identified in Tables 3-1, 3-2, and 3-3 were evaluated for possible inclusion in Phase 2. The results of the data quality review described in this technical memorandum are summarized in Table 4-1. Approximately two-thirds of the datasets (44 of 63), representing 70% of the samples summarized in Tables 3-1, 3-2, and 3-3, were considered acceptable for all uses in Phase 2. Datasets not reviewed by EPA or Windward may be reviewed later if a critical need is established for the data in Phase 2.

Table 4-1. Summary of data quality reviews for LDW sediment and tissue chemistry datasets

	Number of Datasets		
	Acceptable for All Uses	Not Acceptable for All Uses	Acceptability Determination Pending
Sediment datasets used in Phase 1 (Table 3-4)			
Category 1 (reviewed by EPA)	12	1	
Category 2 (previously approved for use by EPA)	5		
Category 3 (not reviewed by EPA; reviewed by Windward)	3	1	
Category 3 (not reviewed by EPA or Windward)		9	

[1] Data on PCTs were also collected during this investigation, but these chemicals have not been included in the LDW RI because the potential health effects of these chemicals are unknown.

	Number of Datasets		
	Acceptable for All Uses	Not Acceptable for All Uses	Acceptability Determination Pending
Tissue datasets used in Phase 1 (Table 3-4)			
Category 1 (reviewed by EPA)	3		1
Category 2 (previously approved for use by EPA)	2		
Category 3 (not reviewed by EPA; reviewed by Windward)	3		
Category 3 (not reviewed by EPA or Windward)		4	
Datasets not previously reviewed in Phase 1 (Table 3-5)			
Sediment	15	2	
Tissue	1		1
Total	44	17	2

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Appendix A. Dataset Summaries

This appendix summarizes sediment and tissue chemistry datasets to be used in the Phase 2 RI (Tables A-1 and A-2, respectively) and sediment and tissue chemistry datasets that will not be used in the Phase 2 RI (Tables A-3 and A-4, respectively). These tables will be amended, as necessary, when additional datasets are identified and reviewed.

Table A-1. Sediment chemistry datasets to be used in the Phase 2 RI/FS

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Slip 4 early action area site characterization	Slip4-EarlyAction	2004	Slip 4 (RM 2.8-2.9 east)	PCB Aroclors, mercury	29 grab samples (van Veen) from 0-10 cm; 58 core samples (vibracorer) taken from 11 locations; 4-6 samples taken at each location to a depth of 360 cm	data validation and data quality review consistent with EPA guidelines; data collected under existing LDW RI AOC, so no data quality review is needed in this memorandum	unpublished data from Integral Consulting
Additional vertical characterization, Duwamish Sediment Other Area	DSOAvert char2	2004	RM 2.8-3.7 east	PCB Aroclors	28 core samples (vibracorer) taken from 15 locations; 1-3 samples from each location from 60-144 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.7)	MCS Environment al (2004)
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 5, April 2004.	Norfolk-monit7	2004	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.8)	unpublished data from King County
Duwamish/Diagonal pre- and post-cleanup monitoring data	DuwDiag-Dredge Monitoring	2003-2004	RM 0.4-0.6 east	metals, PCB Aroclors, pesticides, SVOCs	24 composite samples from 10 grab samples (van Veen) from 0-10 cm at 12 locations, sampled both before dredging and after dredging	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.9)	unpublished data from King County
Terminal 117 early action area site characterization	T117 Boundary Definition	2003-2004	RM 3.6-3.7 west	PCB Aroclors; metals, SVOCs on selected samples	46 grab samples (power grab or by hand from intertidal) from 0-10 cm; 101 core samples (vibracorer) from 18 locations, 3-6 samples collected at each core location to a depth of 300 cm [c]	data validation and data quality review consistent with EPA guidelines; data collected under existing LDW RI AOC, so no data quality review is needed in this memorandum	Windward (2004a; 2004b)

SAMPLING EVENT	EVENT CODE	YEAR	LOCATION	CHEMICALS	SAMPLE SUMMARY	DATA QUALITY REVIEW ACTIONS/CONCLUSIONS [a]	REFERENCE
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 4, April 2003.	Norfolk-monit6	2003	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.10)	King County (2003)
Sediment characterization results for the Duwamish River navigational channel turning basin	Turning-basin	2003	RM 4.2-4.7	metals, PCB Aroclors, pesticides, SVOCs	5 core samples (vibracorer) taken down to depths of 144 to 390 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.11)	Anchor (2003)
Boeing Plant 2 transformer investigation – Phase 1	Plant 2-Trans-former Phase1	2003	RM 3.6 east	PCB Aroclors	5 surface grab samples (by hand) taken from 0-5 cm; 46 core samples (vibracorer) taken from 13 locations; 3-5 samples at each location from 0-240 cm [b]	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.12)	Floyd Snider McCarthy (2004)
Norfolk combined sewer overflow (Duwamish River) sediment cap recontamination. Phase I investigation.	Ecology-Norfolk	2002	RM 4.9-5.0 east	PCB Aroclors	20 grab samples (van Veen) from 0-10 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.13)	Ecology (2003)
Norfolk CSO sediment remediation project five-year monitoring program: Annual monitoring report - year 3, April 2002.	Norfolk-monit5	2002	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	QC consistent with previous King County events approved for all uses by EPA; validation qualifiers added to database (see Section 3.2.15)	King County (2002)
Data report, DSOA vertical characterization and outfall 12 data collection. Duwamish sediment other area, Boeing Plant 2	DSOAvert char	2001	RM 2.8-3.7 east	PCB Aroclors	125 core samples (vibracorer) from 37 locations; 2-6 samples at each location, most locations starting at 60 cm down to depths of 150-280 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.16)	Pentec (2001)
Norfolk CSO five-year monitoring program, Year Two, April 2001	Norfolk-monit4	2001	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	validation qualifiers added to database (Section 3.2.1)	King County (2001b)
Norfolk CSO five-year monitoring program – Twelve-month post construction	Norfolk-monit3	2000	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	validation qualifiers added to database (Section 3.2.1)	King County (2000c)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Norfolk CSO five-year monitoring program – Supplemental nearshore sampling	Norfolk-monit2b	2000	RM 4.9-5.0 east	PCB Aroclors	Composites of 3 grab samples (van Veen) at each of 3 locations; 3 samples from 0-2 cm; 3 samples from 0-10 cm	validation qualifiers added to database (Section 3.2.1)	King County (2000b)
Outfall and nearshore sediment sampling report, Duwamish Facility	James Hardie Outfall	2000	RM 1.5 east	metals, PCB Aroclors, SVOCs	9 grab samples (van Veen or by hand in intertidal) from 0-10 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.17)	Weston (2000)
PSDDA sediment characterization of Duwamish River navigation channel: FY2000 operations and maintenance dredging data report	PSDDA99	1999	RM 1.9-3.4	metals, PCB Aroclors, pesticides, SVOCs	20 composite core samples (vibracorer) taken from 18 locations; three borings made at each location; 18 samples from 0 to 120 cm; 2 samples from 120 to 240 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.18)	Striplin (SEA 2000a, b)
Norfolk CSO five-year monitoring program – Six-month post construction	Norfolk-monit2a	1999	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-2 cm; 4 samples from 0-10 cm	validation qualifiers added to database (Section 3.2.1)	King County (2000d)
Norfolk CSO five-year monitoring program – Post backfill	Norfolk-monit1	1999	RM 4.9-5.0 east	metals, PCB Aroclors, SVOCs	Composites of 3 grab samples (van Veen) at each of 4 locations; 4 samples from 0-10 cm	validation qualifiers added to database (Section 3.2.1)	King County (1999b)
PSDDA sediment characterization of Duwamish River navigation channel: FY99 operations and maintenance dredging data report.	PSDDA98	1998	RM 3.5-4.6	metals, PCB Aroclors, pesticides, SVOCs	10 core samples (vibracorer) taken from 12 locations; 7 samples taken from 0 to 60-90 cm, each from single location; 3 samples taken from 2 or 3 locations (0-60 cm, 0-120 cm, and 120-360 cm)	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.19)	Striplin (1998)
EPA Site Inspection: Lower Duwamish River	EPA SI	1998	entire LDW study area	metals, pesticides, PCB Aroclors & selected congeners, dioxins & furans, TBT, SVOCs, VOCs	300 grab samples from 0-10 cm (van Veen); 33 core samples (vibracorer) from 0-60 and 60-120 cm from 17 locations	data collected by EPA for Superfund program; acceptable for all uses	Weston (1999)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
King County combined sewer overflow water quality assessment for the Duwamish River and Elliott Bay	KC WQA	1997	Duwamish/ Diagonal (RM 0.5-0.6 east); Kellogg Island (RM 0.7 west); Brandon CSO (RM 1.1 east); 8th Ave CSO (RM 2.8 west); South Park (RM 3.3 east); Hamm Creek (RM 4.4 west)	metals, PCB Aroclors, SVOCs, TBT	0-10 cm grab samples (van Veen) from 14 locations; single samples from 5 Duwamish/Diagonal locations and 4 Kellogg Island locations; weekly samples from Kellogg Island (9 samples), Brandon (13 samples), 8th Ave (9 samples), South Park (4 samples), Hamm Creek (4 samples)	validation qualifiers added to database (Section 3.2.1)	King County (1999a)
Duwamish Waterway Phase 1 site characterization	Boeing SiteChar	1997	RM 1.8-2.0 west; Slip 4 (RM 2.8-2.9 east); RM 3.6-4.0; RM 4.2-5.0 east	metals, PCB Aroclors, SVOCs	88b grab samples (van Veen) from 0-10 cm	accepted by EPA for all uses (Section 3.2.2)	Exponent (1998)
Duwamish Waterway sediment characterization study	NOAA SiteChar	1997	entire LDW study area	total PCBs, selected PCB congeners, total PCTs	328 grab samples (van Veen) from 0-10 cm	validation qualifiers added to database; congener data not appropriate for use in Phase 2 risk assessments (Section 3.2.3)	NOAA (1997; 1998)
Seaboard Lumber site, Phase 2 site investigation	Seaboard-Ph2	1996	RM 0.4-0.7 west	metals, PCB Aroclors, SVOCs	20 grab samples (van Veen) from 0-10 cm	accepted by EPA for all uses (Section 3.2.4)	Herrera (1997)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 2b	Plant 2 RFI-2b	1996	RM 2.8-3.7 east	metals, PCB Aroclors, SVOCs	39 grab samples (van Veen) from 0-10 cm; 44 core samples (vibracorer) from 15 locations – 2 to 4 samples per core, up to 480 cm below mudline	validation qualifiers J+/J- changed to JH/JL; accepted by EPA for all uses	Weston (1998)
Duwamish/Diagonal cleanup Study – Phase 2	Duw/Diag-2	1996	RM 0.4-0.6 east	metals, PCB Aroclors, SVOCs, TPH	36 grab samples (van Veen) from 0-10 cm; 53 core samples (vibracorer) from 15 locations – 1 to 6 samples per core, up to 270 cm below mudline	validation qualifiers added to database (Section 3.2.1)	King County (2000a)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Duwamish/Diagonal cleanup Study – Phase 1.5	Duw/ Diag-1.5	1995	RM 0.4-0.6 east	metals, PCB Aroclors, SVOCs, TBT	12 grab samples (van Veen) from 0-10 cm	validation qualifiers added to database (Section 3.2.1)	King County (2000a)
Norfolk CSO sediment cleanup study – Phase 3	Norfolk-cleanup3	1995	RM 4.9-5.0 east	PCB Aroclors	16 grab samples (van Veen) from 0-10 cm	validation qualifiers added to database (Section 3.2.1)	King County (1996)
Norfolk CSO sediment cleanup study – Phase 2	Norfolk-cleanup2	1995	RM 4.9-5.0 east	metals, pesticides, PCB Aroclors and selected congeners, SVOCs, VOCs, TPH	12 grab samples (van Veen) from 0-10 cm; 27 core samples (vibracorer) from 3 locations at 30 or 60 cm intervals up to 180 cm below mudline	validation qualifiers added to database (Section 3.2.1)	King County (1996)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 2a	Plant 2 RFI-2a	1995	RM 2.8-3.7 east	metals, PCB Aroclors SVOCs	54 grab samples (van Veen) from 0-10 cm	validation qualifiers J+/J- changed to JH/JL; accepted by EPA for all uses	Weston (1998)
RCRA Facility Investigation Duwamish Waterway sediment investigation, Plant 2 – Phase 1	Plant 2 RFI-1	1995	RM 2.8-3.7 east	metals, PCB Aroclors, TPH, SVOCs, VOCs	65 grab samples (van Veen) from 0-10 cm; 22 core samples (vibracorer) from 12 locations at 15-45 cm intervals down to 135 cm below mudline	validation qualifiers J+/J- changed to JH/JL; accepted by EPA for all uses	Weston (1998)
Duwamish/Diagonal cleanup Study – Phase 1	Duw/Diag-1	1994	RM 0.4-0.6 east	metals, pesticides, PCB Aroclors, SVOCs, TBT	38 grab samples (van Veen) from 0-10 cm; 2 grab samples (van Veen) from 0-15 cm; 12 core samples (vibracorer) from 2 locations at 15-30 cm intervals down to 150 cm below mudline	validation qualifiers added to database (Section 3.2.1)	King County (2001a)
Norfolk CSO sediment cleanup study – Phase 1	Norfolk-cleanup1	1994	RM 2.8-3.7 east	metals, pesticides, SVOCs, PCB Aroclors, VOCs	21 grab samples (van Veen) from 0-10 cm; 3 core samples from 1 location – 15-30, 30-45, and 45-60 cm	validation qualifiers added to database (Section 3.2.1)	King County (1996)
Rhône-Poulenc RCRA Facility Investigation for the Marginal Way facility – Round 2	Rhône-Poulenc RFI-2	1994	Slip 6 (RM 4.2 east)	metals, SVOCs, PCB Aroclors 1254 and 1260, pesticides	7 grab samples (van Veen) from 0-2 cm	accepted by EPA for all uses (Section 3.2.5)	Rhône-Poulenc (1995)

SAMPLING EVENT	EVENT CODE	YEAR	LOCATION	CHEMICALS	SAMPLE SUMMARY	DATA QUALITY REVIEW ACTIONS/CONCLUSIONS [a]	REFERENCE
Results of sampling and analysis, sediment monitoring plan, Duwamish Shipyard, Inc.	Duwamish Shipyard	1993	RM 1.4-1.5 west	metals, SVOCs, TBT	5 grab samples (van Veen) from 0-10 cm	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.20)	Hart Crowser (1993)
Harbor Island Remedial Investigation	Harbor Island RI	1991	RM 0.0-0.4	metals, pesticides, PCB Aroclors, SVOCs, VOCs, TPH, TBT	34 grab samples (van Veen) from 0-10 cm	data collected by EPA for Superfund program; acceptable for all uses	Weston (1993)

[a] All events listed on this table are: 1) considered acceptable for all uses in Phase 2, even if not specifically mentioned, 2) acceptable for some uses, but not others, as noted, or 3) undergoing additional review by EPA; acceptability determination is still pending

[b] Sample total does not include three reference samples that were collected upstream of the study area

[c] Does not include soil, groundwater, and seep data collected concurrently during this investigation

NOAA – National Oceanic and Atmospheric Administration

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

PCT – polychlorinated terphenyl

RCRA – Resource Conservation and Recovery Act

SVOC – semivolatile organic compound

TBT – tributyltin

TPH – total petroleum hydrocarbon

VOC – volatile organic compound

Table A-2. Tissue chemistry datasets to be used in the Phase 2 RI/FS

SAMPLING EVENT	EVENT CODE	YEAR	LOCATION	CHEMICALS	SAMPLE SUMMARY	DATA QUALITY REVIEW ACTIONS/CONCLUSIONS [a]	REFERENCE
East Waterway, Harbor Island Superfund site: Technical memorandum: Tissue chemistry results for juvenile chinook salmon collected from Kellogg Island and East Waterway.	EW-Salmon	2002	Kellogg Island (RM 0.8-0.9 west)	PCB Aroclors, mercury	12 composite samples of whole-body juvenile chinook salmon (6 from LDW, 6 from East Waterway) collected by beach seine; each sample consisted of 6-7 fish	data validation consistent with EPA guidelines; laboratory Form 1s present in data report; validation qualifiers added to database (see Section 3.2.21)	Windward (2002)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
NMFS Duwamish injury assessment project	NOAA-salmon2	2000	Kellogg Island (RM 0.8-0.9 west), Slip 4 (RM 2.8 east)	PCB congeners, pesticides (salmon); PCB Aroclors (shiner perch)	29 samples of whole-body juvenile chinook salmon collected by beach seine (9 were composites of 3-10 fish, 20 were individual fish); 6 composite samples of chinook salmon stomach contents; 2 composite samples of whole-body shiner perch	neither EPA nor LDWG plan to conduct a review of the salmon portion of this dataset because LDWG's 2003 juvenile chinook salmon sampling results make the effort required for such a review unwarranted, as documented by Windward (2005); therefore, these data will not be used in Phase 2; the shiner perch portion of the dataset has been previously approved for all uses by EPA (2003)	NMFS (2002)
Preliminary exposure assessment of dioxin-like chlorobiphenyls in great blue herons of the lower Duwamish River	Heron USFWS	1998	heron colony west of RM 0.5 west	PCB congeners	6 samples taken from 5 great blue heron eggs collected by hand from nest (5 egg samples, 1 egg yolk sample)	no formal data validation conducted, laboratory Form 1s not present in data report; EPA plans to conduct additional QA review of this dataset; determination of whether these data will be used in Phase 2 is therefore pending	Krausmann (2002)
Waterway Sediment Operable Unit Harbor Island Superfund Site	WSOU	1998	RM 0.4-0.9 (crab), RM 2.0-4.4 (English sole), RM 0.0-0.2 (striped perch)	Hg, TBT, PCBs	3 English sole skinless fillet composite samples (5 fish/composite caught by trawl); 3 red rock crab edible meat composite samples (5 crab/composite caught by crab trap); 1 Dungeness crab edible meat sample (1 individual caught by crab trap); 3 striped perch skinless fillet samples (5 fish/composite for 2 samples, 1 individual fish for 1 sample; caught by diver)	collected under EPA oversight for a previously conducted Superfund risk assessment; previously approved for all uses by EPA (2003)	ESG (1999)
King County Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay	KC WQA	1996-1997	RM 0.5-0.9	metals, TBT, SVOCs, PCBs	3 English sole skinless fillet composite samples (20 fish/composite caught by trawl); 3 English sole whole-body composite samples [b] (20 fish/composite caught by trawl); 2 Dungeness crab edible meat composite samples (3 crabs/sample caught by crab trap); 1 Dungeness crab hepatopancreas composite sample (3 crabs caught by crab trap); 4 amphipod composite samples (caught by benthic sledge); 3 shiner surfperch whole-body composite samples (10 fish/sample caught by trawl); 22 mussels edible meat composite samples (20 mussels/sample collected by hand) [c]	add validation qualifiers (Section 3.2.1); English sole whole-body composite samples not acceptable for all uses because they don't truly represent whole bodies	King County (1999a)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Actions/Conclusions [a]	Reference
Puget Sound Ambient Monitoring Program – annual sampling	PSAMP -fish	1992	RM 0.4-1.3	SVOCs, pesticides, PCBs, As, Cu, Pb, Hg	3 English sole skinless fillet (10-20 fish/sample collected by trawl)	acceptable for all uses (see Section 3.2.6)	West et al. (2001)
		1995	RM 0.4-1.3	pesticides, PCBs, As, Cu, Pb, Hg	3 English sole skinless fillet composite samples (10-20 fish/sample collected by trawl)	acceptable for all uses (see Section 3.2.6)	
		1997	RM 0.4-1.3	Hg, pesticides	3 English sole skinless fillet composite samples (10-20 fish/sample collected by trawl)	acceptable for all uses (see Section 3.2.6)	
Elliott Bay/Duwamish River Fish Tissue Investigation	EVS 95	1995	RM 1.1-1.4	PCBs, Hg, MeHg, TBT	3 English sole skinless fillet composite samples (6 fish/sample collected by trawl)	collected under EPA oversight for a previously conducted Superfund risk assessment; previously approved for all uses by EPA (2003)	Battelle (1996); EVS (unpublished); Frontier Geosciences (1996)
Contaminant exposure and associated biochemical effects in outmigrant juvenile chinook salmon from urban and non-urban estuaries of Puget Sound	NOAA-salmon	1989-1990	RM 0.7	pesticides, PCBs, PAHs	14 composite samples of whole-body juvenile chinook salmon collected by beach seine (2-10 fish/sample); 6 composite samples of stomach contents (10 fish/sample) [d]	neither EPA nor LDWG plan to conduct a review of this dataset because LDWG's 2003 juvenile chinook salmon sampling results make the effort required for such a review unwarranted; therefore, these data will not be used in Phase 2	Varanasi et al. (1993)

[a] All events listed on this table are: 1) considered acceptable for all uses in Phase 2, even if not specifically mentioned, 2) acceptable for some uses, but not others, as noted, or 3) undergoing additional review by EPA; acceptability determination is still pending

[b] Samples are of remnant tissues following the subsampling of fillet tissue. In addition, livers were removed from some fish in the composite samples.

[c] Sample counts do not include data from cooked crab and English sole samples or data from caged mussel deployments. These data will not be used in the Phase 2 RI

[d] Six composite samples of juvenile chinook salmon livers were also analyzed, but these data were not used in the Phase 1 RI.

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

TBT – tributyltin

MeHg – methylmercury

Table A-3. Sediment chemistry datasets that will not be used in the Phase 2 RI/FS

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Action/ Conclusions	Reference
Dredge material characterization Duwamish Yacht Club	Duwam Yacht Club	1999	RM 4.1 west	metals, pesticides, PCB Aroclors, SVOCs, VOCs, TBT	6 core samples (vibracorer), each made from 2 separate cores collected to 50-65 cm	not reviewed by Windward; sediment characterized has been dredged	Hart Crowser (1999)
Sediment sampling and analysis James Hardie Gypsum Inc. – Round 1	Hardie Gypsum-1	1999	RM 1.6-1.7 east	metals, pesticides, PCB Aroclors, SVOCs, VOCs	5 core samples (vibracorer) made from single cores down to 120 cm	not reviewed by Windward; sediment characterized has been dredged	Spearman (1999)
Sediment sampling and analysis James Hardie Gypsum Inc. – Round 2	Hardie Gypsum-2	1999	RM 1.6-1.7 east	metals, pesticides, PCB Aroclors, SVOCs, VOCs	9 core samples (vibracorer) made from single cores down to 90 cm	not reviewed by Windward; sediment characterized has been dredged	Spearman (1999)
Dredge material characterization Hurlen Construction Company & Boyer Alaska Barge Lines berthing areas	Hurlen-Boyer	1998	RM 2.4-2.7 west	metals, pesticides, PCB Aroclors, SVOCs, TBT, TPH	6 core samples (vibracorer), 2 from Boyer, 4 from Hurlen, each made from 2 separate cores collected to 60-120 cm	not reviewed by Windward; sediment characterized has been dredged	Hart Crowser (1998)
Sediment quality in Puget Sound. Year 2 – Central Puget Sound	PSAMP/ NOAA98	1998	RM 0.5, 0.6, 1.8	metals, PCB Aroclors, pesticides, SVOCs, TBT	3 grab samples (van Veen) collected from 0-2 cm	LDWG did not conduct a review of this dataset because the QA/QC information was not readily available. The effort that would have been required to obtain this QA/QC information was not justified for the purposes of the Phase 2 RI and risk assessments.	Ecology (2000)
RCRA facility investigation (RFI) report for the Marginal Way facility. Round 3 data and sewer sediment technical memorandum.	Rhône Poulenc RFI3	1996	RM 4.2 east	metals, phenols (4 samples)	16 grab samples collected by hand from 0-10 cm	data validation consistent with EPA guidelines, but laboratory Form 1s not present in data report; Phase 2 RI DQOs not met, so not acceptable for all uses	Rhône-Poulenc (1996)
Proposed dredging of Slip No. 4, Duwamish River, Seattle, WA	Slip4-Crowley	1996	RM 2.8 east	metals, pesticides, PCB Aroclors, SVOCs, VOCs, TBT	4 core samples (vibracorer) composited from sediment at 9 locations collected to a depth of 70-130 cm	not reviewed by Windward; sediment characterized has been dredged	PTI (1996)
1996 USACE Duwamish O&M	PSDDA96	1996	RM 4.2-4.6	metals, pesticides, PCB Aroclors, SVOCs, VOCs,	4 core samples (vibracorer) collected to a depth of 120 cm	not reviewed by Windward; sediment characterized has been dredged	Striplin (1996)

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality Review Action/ Conclusions	Reference
Lone Star Northwest and James Hardie Gypsum – Kaiser dock upgrade	Lone Star-Hardie Gypsum	1995	RM 1.6 east	metals, pesticides, PCB Aroclors, SVOCs, VOCs	5 core samples (vibracorer); 4 collected to a depth of 120-150 cm, 1 at 120-360 cm	not reviewed by Windward; sediment characterized has been dredged	Hartman (1995)
Rhône-Poulenc RCRA Facility Investigation for the Marginal Way facility – Round 1	Rhône-Poulenc RFI-1	1994	RM 4.2 east	metals, SVOCs, PCB Aroclors, pesticides	7 grab samples (van Veen) collected from 0-15 cm	data validation consistent with EPA guidelines, but laboratory Form 1s not present in data report; Phase 2 RI DQOs not met, so not acceptable for all uses	Rhône-Poulenc (1995)
Lone Star Northwest – West Terminal US ACOE – Seattle	Lone Star 92	1992	RM 1.5 east	metals, pesticides, PCB Aroclors, SVOCs, VOCs	1 core sample (vibracorer), made from 2 separate cores collected to 120 cm	not reviewed by Windward; sediment characterized has been dredged	Hartman (1992)
Sediment sampling and analysis, South Park Marina, Duwamish Waterway, Seattle, Washington.	South Park Marina	1991	RM 3.5 west	metals, SVOCs, PCB Aroclors, pesticides	2 core samples (vibracorer), each made from 2 separate cores collected to 120 cm	data not reviewed because of age of data; sediment characterized has been dredged	Spearman (1991)

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

TBT – tributyltin

TPH – total petroleum hydrocarbon

VOC – volatile organic compound

Table A-4. Tissue chemistry datasets that will not be used in the Phase 2 RI/FS

Sampling Event	Event Code	Year	Location	Chemicals	Sample Summary	Data Quality review Actions/Conclusions	Reference
Puget Sound Ambient Monitoring Program – annual sampling	PSAMP - fish	1992	RM 0.7	SVOCs, pesticides, PCBs, As, Cu, Pb, Hg	6 coho salmon and 6 chinook salmon composite fillet samples (5 fish/composite caught by gill net)	Adult salmon; data were summarized in the Phase 1 RI, but were not used in the risk assessments because almost all the chemicals in these fish are associated with exposure outside the LDW	West et al. (2001)
		1993	RM 0.7	pesticides, PCBs, As, Cu, Pb, Hg	1993: 5 coho salmon and 6 chinook salmon composite fillet samples (5 fish/composite caught by gill net); 1994: 5 coho salmon composite fillet samples and 6 chinook salmon filet samples (5 composite, 1 individual) (5 fish/composite caught by gill net); 1995: 7 coho salmon (6 composite, 1 individual) and 15 chinook salmon filet samples (13 composite, 2 individual) (5 fish/composite caught by gill net); 1996: 19 coho salmon (5 composite, 14 individual) and 49 chinook salmon fillet samples (all individual) (5 fish/composite caught by gill net)		
		1998	RM 0.7	Hg, pesticides	13 coho salmon composite fillet samples (5 fish/composite caught by gill net)		

PCB – polychlorinated biphenyl

SVOCs – semivolatile organics

Appendix B. Sample-specific Data Qualifier Changes

This appendix lists the sample-specific data qualifier changes resulting from the data quality reviews summarized in this memorandum.

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DSOAvertchar	DUW135	DUW135-0020	Aroclor-1254		J	J	JL	J
DSOAvertchar	DUW132	DUW132-0040	Aroclor-1254		J	J	JL	J
DSOAvertchar	DUW132	DUW132-0040	Aroclor-1260		J	J	JL	J
DSOAvertchar	DUW134	DUW134-0020	Aroclor-1260		J	J	JK	J
DSOAvertchar	DUW135	DUW135-0020	Aroclor-1260		J	J	JL	J
DSOAvertchar	DUW132	DUW132-0040	Cadmium		J	J	JK	J
DSOAvertchar	DUW133	DUW133-0020	Chromium		J	J	JL	J
DSOAvertchar	DUW132	DUW132-0040	Chromium		J	J	JK	J
DSOAvertchar	DUW133	DUW133-0020	Copper		J	J	JK	J
DSOAvertchar	DUW132	DUW132-0040	Lead		J	J	JK	J
DSOAvertchar	DUW133	DUW133-0020	Lead		J	J	JK	J
DSOAvertchar	DUW135	DUW135-0040	Mercury		J	J	JK	J
DSOAvertchar	DUW132	DUW132-0040	Zinc		J	J	JK	J
DSOAvertchar	DUW133	DUW133-0020	Zinc		J	J	JH	J
DSOAvertchar2	DUW146	DUW146-0020	Aroclor-1248		J	J	JK	J
DSOAvertchar2	DUW146	DUW146-0030	Aroclor-1254		J	J	JK	J
DSOAvertchar2	DUW146	DUW146-0020	Aroclor-1254		J	J	JK	J
DSOAvertchar2	DUW146	DUW146-0030	Aroclor-1260		J	J	JK	J
DSOAvertchar2	DUW146	DUW146-0020	Aroclor-1260		J	J	JK	J
DSOAvertchar2	DUW137	DUW137-0020	Aroclor-1260		J	J	JK	J
DSOAvertchar2	DUW146	DUW146-0040	Total Organic Carbon (TOC)		J	J	JK	J
DSOAvertchar2	DUW146	DUW146-0030	Total Organic Carbon (TOC)		J	J	JK	J
DSOAvertchar2	DUW146	DUW146-0020	Total Organic Carbon (TOC)		J	J	JK	J
DuwamishShipyards	SS-5	SS-5	2-Methylnaphthalene	J		J	JK	J
DuwamishShipyards	SS-3	SS-3	Acenaphthene	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Acenaphthylene	J		J	JK	J
DuwamishShipyards	SS-5	SS-5	Acenaphthylene	J		J	JK	J
DuwamishShipyards	SS-3	SS-6	Acenaphthylene	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Antimony			J	JK	J
DuwamishShipyards	SS-2	SS-2	Antimony			J	JK	J
DuwamishShipyards	SS-3	SS-3	Antimony			J	JK	J
DuwamishShipyards	SS-5	SS-5	Antimony			J	JK	J
DuwamishShipyards	SS-3	SS-6	Antimony			J	JK	J
DuwamishShipyards	SS-3	SS-6	Butyl benzyl phthalate	J		J	JK	J
DuwamishShipyards	SS-2	SS-2	Carbazole	J		J	JK	J
DuwamishShipyards	SS-3	SS-3	Carbazole	J		J	JK	J
DuwamishShipyards	SS-4	SS-4	Carbazole	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Copper			J	JK	J
DuwamishShipyards	SS-2	SS-2	Copper			J	JK	J
DuwamishShipyards	SS-3	SS-3	Copper			J	JK	J
DuwamishShipyards	SS-5	SS-5	Copper			J	JK	J
DuwamishShipyards	SS-3	SS-6	Copper			J	JK	J
DuwamishShipyards	SS-2	SS-2	Dibenzo(a,h)anthracene	J		J	JK	J
DuwamishShipyards	SS-3	SS-3	Dibenzofuran	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Dibutyltin as ion			J	JK	J
DuwamishShipyards	SS-2	SS-2	Dibutyltin as ion			J	JK	J
DuwamishShipyards	SS-3	SS-3	Dibutyltin as ion			J	JK	J
DuwamishShipyards	SS-4	SS-4	Dibutyltin as ion			J	JK	J
DuwamishShipyards	SS-5	SS-5	Dibutyltin as ion			J	JK	J
DuwamishShipyards	SS-3	SS-6	Dibutyltin as ion			J	JK	J
DuwamishShipyards	SS-1	SS-1	Dimethyl phthalate	J		J	JK	J
DuwamishShipyards	SS-5	SS-5	Dimethyl phthalate	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Fluoranthene	J		J	JK	J
DuwamishShipyards	SS-4	SS-4	Fluorene	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Lead			J	JK	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwamishShipyards	SS-2	SS-2	Lead			J	JK	J
DuwamishShipyards	SS-3	SS-3	Lead			J	JK	J
DuwamishShipyards	SS-5	SS-5	Lead			J	JK	J
DuwamishShipyards	SS-3	SS-6	Lead			J	JK	J
DuwamishShipyards	SS-1	SS-1	Monobutyltin as ion	U		UJ	UJK	UJ
DuwamishShipyards	SS-2	SS-2	Monobutyltin as ion	U		UJ	UJK	UJ
DuwamishShipyards	SS-3	SS-3	Monobutyltin as ion			J	JK	J
DuwamishShipyards	SS-4	SS-4	Monobutyltin as ion			J	JK	J
DuwamishShipyards	SS-5	SS-5	Monobutyltin as ion			J	JK	J
DuwamishShipyards	SS-3	SS-6	Monobutyltin as ion	U		UJ	UJK	UJ
DuwamishShipyards	SS-1	SS-1	Naphthalene	J		J	JK	J
DuwamishShipyards	SS-3	SS-3	Naphthalene	J		J	JK	J
DuwamishShipyards	SS-5	SS-5	Naphthalene	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Phenol	J		J	JK	J
DuwamishShipyards	SS-1	SS-1	Tributyltin as ion			J	JK	J
DuwamishShipyards	SS-2	SS-2	Tributyltin as ion			J	JK	J
DuwamishShipyards	SS-3	SS-3	Tributyltin as ion			J	JK	J
DuwamishShipyards	SS-4	SS-4	Tributyltin as ion			J	JK	J
DuwamishShipyards	SS-5	SS-5	Tributyltin as ion			J	JK	J
DuwamishShipyards	SS-3	SS-6	Tributyltin as ion			J	JK	J
DuwamishShipyards	SS-1	SS-1	Zinc			J	JK	J
DuwamishShipyards	SS-2	SS-2	Zinc			J	JK	J
DuwamishShipyards	SS-3	SS-3	Zinc			J	JK	J
DuwamishShipyards	SS-5	SS-5	Zinc			J	JK	J
DuwamishShipyards	SS-3	SS-6	Zinc			J	JK	J
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Mercury	E		J	JK	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Phenanthrene	EGL		J	JK	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Anthracene	G		J	JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Anthracene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Benzo(g,h,i)perylene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Benzoic acid	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Iron	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Phenanthrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Pyrene	G		J	JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Pyrene	G		J	JL	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	4,4'-DDE	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	alpha-Chlordane	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	alpha-Chlordane	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	alpha-Chlordane	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	alpha-Chlordane	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	alpha-Chlordane	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Aluminum	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Arsenic	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Benzo(a)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Benzo(a)pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Benzo(a)pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Benzo(a)pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Benzo(a)pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Benzo(a)pyrene	L		J	JH	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Benzo(a)pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Benzo(a)pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Benzo(a)pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Benzo(k)fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Chrysene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Dibenzo(a,h)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Dibenzo(a,h)anthracene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Fluoranthene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Pyrene	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Silver	L		J	JH	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Silver	L		J	JH	J
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Mercury	UE		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	2,4,5-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	2,4,5-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	2,4,5-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	2,4,5-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	2,4,5-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	2,4,5-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	2,4,6-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	2,4,6-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	2,4,6-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	2,4,6-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	2,4,6-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	2,4,6-Trichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	2,4-Dichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	2,4-Dichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	2,4-Dichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	2,4-Dichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	2,4-Dichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	2,4-Dichlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	2,4-Dimethylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	2-Chlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	2-Chlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	2-Chlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	2-Chlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	2-Chlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	2-Chlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	2-Methylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	2-Methylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	2-Methylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	2-Methylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	2-Methylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	2-Methylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	2-Nitrophenol	UG		UJ	UJL	UJ

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	2-Nitrophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	4-Methylphenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Anthracene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Anthracene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Anthracene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Anthracene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Antimony	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Benzo(g,h,i)perylene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Benzo(g,h,i)perylene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Benzo(g,h,i)perylene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Benzo(g,h,i)perylene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Benzo(g,h,i)perylene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Benzo(g,h,i)perylene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Benzoic acid	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Benzoic acid	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Benzoic acid	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Benzoic acid	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Benzoic acid	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Benzyl alcohol	UG		UJ	UJL	UJ

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Benzyl alcohol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	beta-BHC	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	bis(2-chloroethyl)ether	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Coprostanol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Endrin aldehyde	UG		UJ	UJL	UJ

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Endrin aldehyde	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Naphthalene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Pentachlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Pentachlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Pentachlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Pentachlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Pentachlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Pentachlorophenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Phenanthrene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Phenanthrene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Phenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Phenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Phenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Phenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Phenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Phenol	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Pyrene	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Pyridine	UG		UJ	UJL	UJ

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Pyridine	UG		UJ	UJL	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	2,4-Dimethylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	2,4-Dimethylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	2,4-Dimethylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	2,4-Dimethylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	2,4-Dimethylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	2,4-Dimethylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	4-Methylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	4-Methylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	4-Methylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	4-Methylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	4-Methylphenol	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	beta-BHC	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Endrin aldehyde	UGL		UJ	UJK	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	2,4-Dimethylphenol	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	2,4-Dimethylphenol	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	4,4'-DDD	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	4,4'-DDT	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	4-Methylphenol	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	4-Methylphenol	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	4-Methylphenol	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Aldrin	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	alpha-BHC	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	alpha-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	alpha-Endosulfan	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Aroclor-1016	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Aroclor-1016	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Aroclor-1016	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Aroclor-1016	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Aroclor-1016	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Aroclor-1016	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Aroclor-1016	UL		UJ	UJH	UJ

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Aroclor-1016	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Aroclor-1260	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	beta-Endosulfan	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	delta-BHC	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Dibenzo(a,h)anthracene	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Dibenzo(a,h)anthracene	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Dibenzo(a,h)anthracene	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Dibenzo(a,h)anthracene	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Dibenzo(a,h)anthracene	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Dibenzo(a,h)anthracene	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Dieldrin	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Endosulfan sulfate	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Endrin	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	gamma-BHC	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	gamma-Chlordane	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Heptachlor	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Heptachlor epoxide	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Methoxychlor	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Toxaphene	UL		UJ	UJH	UJ
DuwDiag-DredgeMonitoring	DUD_2C	L31520-2	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_5C	L31520-6	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_1C	L29990-1	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_12C	L31520-14	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_9C	L31520-11	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_7C	L29990-8	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_8C	L31520-9	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_6C	L31520-7	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_2C	L29990-2	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_4C	L31520-4	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_8C	L31520-10	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_11C	L31520-13	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_4C	L29990-4	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_3C	L31520-3	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_4C	L29990-5	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_4C	L31520-5	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_10C	L31520-12	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_6C	L31520-15	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_5C	L29990-6	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_3C	L29990-3	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_6C	L29990-7	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_1C	L31520-1	Aniline	UX		UR	UR	UR
DuwDiag-DredgeMonitoring	DUD_7C	L31520-8	Aniline	UX		UR	UR	UR
Ecology-Norfolk	2	288131	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	3	288132	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	4	288133	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	11	288140	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	10	288139	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	5	288134	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	8	288137	Aroclor-1248		J	J	JK	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Ecology-Norfolk	6	288135	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	1	288130	Aroclor-1248		J	J	JK	J
Ecology-Norfolk	20	288149	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	16	288145	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	17	288146	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	18	288147	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	7	288148	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	15	288144	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	7	288136	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	9	288138	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	12	288141	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	13	288142	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	14	288143	Aroclor-1254		J	J	JK	J
Ecology-Norfolk	21	288150	Aroclor-1260		J	J	JK	J
JamesHardieOutfall	JHGSA-SD1-CC	JHGSA-SD1-COMP22-00	1,2,4-Trichlorobenzene	J		J	BU	BU
NOAA SiteChar	EIT070	EIT08-02	PCBs (total)				JH	J
NOAA SiteChar	WST323	WST09-02	PCBs (total)				JH	J
NOAA SiteChar	WST323	WST09-02	PCBs (total)				JH	J
NOAA SiteChar	EST163	EST12-01	PCBs (total)				JH	J
NOAA SiteChar	EST169	EST12-05	PCBs (total)				JH	J
NOAA SiteChar	WES236	WEST03	PCBs (total)				JH	J
NOAA SiteChar	WIT280	WIT11-01	PCBs (total)				JH	J
NOAA SiteChar	WES237	WEST04	PCBs (total)				JH	J
NOAA SiteChar	EST219	EST21-03	PCBs (total)				JH	J
NOAA SiteChar	EST164	EST12-02	PCBs (total)				JH	J
NOAA SiteChar	CH0014	CH04-02	PCBs (total)				JH	J
NOAA SiteChar	EIT069	EIT08-01	PCBs (total)				JH	J
NOAA SiteChar	WIT265	WIT07-01	PCBs (total)				JH	J
NOAA SiteChar	WIT265	WIT07-01	PCBs (total)				JH	J
NOAA SiteChar	EIT061	EIT06-02	PCBs (total)				JH	J
NOAA SiteChar	EIT063	EIT07-01	PCBs (total)				JH	J
NOAA SiteChar	WES234	WEST01	PCBs (total)				JH	J
NOAA SiteChar	EIT064	EIT07-02	PCBs (total)				JH	J
NOAA SiteChar	EST149	EST11-01	PCBs (total)				JH	J
NOAA SiteChar	WES235	WEST02	PCBs (total)				JH	J
NOAA SiteChar	WES238	WEST05	PCBs (total)				JH	J
NOAA SiteChar	EST144	EST09-04	PCBs (total)				JH	J
NOAA SiteChar	EIT072	EIT08-03	PCBs (total)				JH	J
NOAA SiteChar	EST165	EST12-03	PCBs (total)				JH	J
NOAA SiteChar	EST165	EST12-03	PCBs (total)				JH	J
NOAA SiteChar	EST165	EST12-03	PCBs (total)				JH	J
NOAA SiteChar	CH1038	CH12-01	PCBs (total)				JH	J
NOAA SiteChar	EIT072	EIT08-03	PCBs (total)				JH	J
NOAA SiteChar	CH0023	CH07-01	PCBs (total)				JH	J
NOAA SiteChar	EST168	EST12-04	PCBs (total)				JH	J
NOAA SiteChar	CH0016	CH04-03	PCBs (total)				JH	J
NOAA SiteChar	WIT282	WIT12-01	PCBs (total)				JH	J
NOAA SiteChar	EST170	EST12-06	PCBs (total)				JH	J
NOAA SiteChar	EST214	EST20-04	PCBs (total)				JH	J
NOAA SiteChar	EST147	EST10-01	PCBs (total)				JH	J
NOAA SiteChar	EST148	EST10-02	PCBs (total)				JH	J
NOAA SiteChar	WIT286	WIT12-03	PCBs (total)				JH	J
NOAA SiteChar	WST321	WST08-04	PCBs (total)				JL	J
NOAA SiteChar	WST326	WST10-02	PCBs (total)				JL	J
NOAA SiteChar	EIT062	EIT06-03	PCBs (total)				JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
NOAA SiteChar	WIT245	WIT01-04	PCBs (total)				JL	J
NOAA SiteChar	WST359	WST19-02	PCBs (total)				JL	J
NOAA SiteChar	WST359	WST19-02	PCBs (total)				JL	J
NOAA SiteChar	EST208	EST19-05	PCBs (total)				JL	J
NOAA SiteChar	EST218	EST21-02	PCBs (total)				JL	J
NOAA SiteChar	EST209	EST19-06	PCBs (total)				JL	J
NOAA SiteChar	EST150	EST11-02	PCBs (total)				JL	J
NOAA SiteChar	WST354	WST18-03	PCBs (total)				JL	J
NOAA SiteChar	WST364	WST19-05	PCBs (total)				JL	J
NOAA SiteChar	EST142	EST09-02	PCBs (total)				JL	J
NOAA SiteChar	EST110	EST03-05	PCBs (total)				JL	J
NOAA SiteChar	EST209	EST19-06	PCBs (total)				JL	J
NOAA SiteChar	EST131	EST07-03	PCBs (total)				JL	J
NOAA SiteChar	WST329	WST10-05	PCBs (total)				JL	J
NOAA SiteChar	EST203	EST19-02	PCBs (total)				JL	J
NOAA SiteChar	WST335	WST11-03	PCBs (total)				JL	J
NOAA SiteChar	WST340	WST13-02	PCBs (total)				JL	J
NOAA SiteChar	CH0030	CH09-01	PCBs (total)				JL	J
NOAA SiteChar	CH1037	CH11-03	PCBs (total)				JL	J
NOAA SiteChar	EIT068	EIT07-05	PCBs (total)				JL	J
NOAA SiteChar	CH1035	CH11-01	PCBs (total)				JL	J
NOAA SiteChar	WST322	WST09-01	PCBs (total)				JL	J
NOAA SiteChar	CH0009	CH03-01	PCBs (total)				JL	J
NOAA SiteChar	EST159	EST11-09	PCBs (total)				JL	J
NOAA SiteChar	WST365	WST19-06	PCBs (total)				JL	J
NOAA SiteChar	CH1040	CH13-01	PCBs (total)				JL	J
NOAA SiteChar	CH0022	CH06-03	PCBs (total)				JL	J
NOAA SiteChar	EST129	EST07-01	PCBs (total)				JL	J
NOAA SiteChar	EST158	EST11-08	PCBs (total)				JL	J
NOAA SiteChar	WST373	WST22-01	PCBs (total)				JL	J
NOAA SiteChar	WST368	WST20-03	PCBs (total)				JL	J
NOAA SiteChar	WST353	WST18-02	PCBs (total)				JL	J
NOAA SiteChar	WST366	WST20-01	PCBs (total)				JL	J
NOAA SiteChar	CH0020	CH06-01	PCBs (total)				JL	J
NOAA SiteChar	WIT273	WIT08-05	PCBs (total)				JL	J
NOAA SiteChar	WST320	WST08-03	PCBs (total)				JL	J
NOAA SiteChar	WST354	WST18-03	PCBs (total)				JL	J
NOAA SiteChar	EST130	EST07-02	PCBs (total)				JL	J
NOAA SiteChar	WST352	WST18-01	PCBs (total)				JL	J
NOAA SiteChar	EIT056	EIT04-03	PCBs (total)				JL	J
NOAA SiteChar	EST132	EST07-04	PCBs (total)				JL	J
NOAA SiteChar	WIT274	WIT08-06	PCBs (total)				JL	J
NOAA SiteChar	WST363	WST19-04	PCBs (total)				JL	J
NOAA SiteChar	WST337	WST12-01	PCBs (total)				JL	J
NOAA SiteChar	CH0002	CH01-02	PCBs (total)				JL	J
NOAA SiteChar	WST333	WST11-01	PCBs (total)				JL	J
NOAA SiteChar	WST303	WST02-02	PCBs (total)				JL	J
NOAA SiteChar	WST315	WST07-01	PCBs (total)				JL	J
NOAA SiteChar	WES241	WEST08	PCBs (total)				JL	J
NOAA SiteChar	EST140	EST08-03	PCBs (total)				JL	J
NOAA SiteChar	WIT279	WIT10-02	PCBs (total)				JL	J
NOAA SiteChar	WIT272	WIT08-04	PCBs (total)				JL	J
NOAA SiteChar	WST349	WST16-02	PCBs (total)				JL	J
NOAA SiteChar	WST314	WST06-02	PCBs (total)				JL	J
NOAA SiteChar	WIT277	WIT10-01	PCBs (total)				JL	J
NOAA SiteChar	EIT052	EIT03-03	PCBs (total)				JL	J
NOAA SiteChar	WST313	WST06-01	PCBs (total)				JL	J
NOAA SiteChar	WIT277	WIT10-01	PCBs (total)				JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
NOAA SiteChar	WIT259	WIT05-02	PCBs (total)				JL	J
NOAA SiteChar	CH0007	CH02-03	PCBs (total)				JL	J
NOAA SiteChar	CH0007	CH02-03	PCBs (total)				JL	J
NOAA SiteChar	CH1034	CH10-02	PCBs (total)				JL	J
NOAA SiteChar	WST311	WST05-01	PCBs (total)				JL	J
NOAA SiteChar	EST134	EST07-06	PCBs (total)				JL	J
NOAA SiteChar	EIT083	EIT11-02	PCBs (total)				JL	J
NOAA SiteChar	WIT264	WIT06-03	PCBs (total)				JL	J
NOAA SiteChar	EIT046	EIT02-01	PCBs (total)				JL	J
NOAA SiteChar	WIT243	WIT01-02	PCBs (total)				JL	J
NOAA SiteChar	WIT257	WIT04-02	PCBs (total)				JL	J
NOAA SiteChar	EIT081	EIT10-02	PCBs (total)				JL	J
NOAA SiteChar	WIT252	WIT03-04	PCBs (total)				JL	J
NOAA SiteChar	WIT252	WIT03-04	PCBs (total)				JL	J
NOAA SiteChar	CH0024	CH07-02	PCBs (total)				JL	J
NOAA SiteChar	EST157	EST11-07	PCBs (total)				JL	J
NOAA SiteChar	EIT055	EIT04-02	PCBs (total)				JL	J
NOAA SiteChar	EST124	EST06-06	PCBs (total)				JL	J
NOAA SiteChar	WST316	WST07-02	PCBs (total)				JL	J
NOAA SiteChar	WST306	WST03-03	PCBs (total)				JL	J
NOAA SiteChar	CH0024	CH07-02	PCBs (total)				JL	J
NOAA SiteChar	WST342	WST14-01	PCBs (total)				JL	J
NOAA SiteChar	WST319	WST08-02	PCBs (total)				JL	J
NOAA SiteChar	CH0024	CH07-02	PCBs (total)				JL	J
NOAA SiteChar	CH0027	CH07-03	PCBs (total)				JL	J
NOAA SiteChar	EST133	EST07-05	PCBs (total)				JL	J
NOAA SiteChar	WIT269	WIT08-01	PCBs (total)				JL	J
NOAA SiteChar	WIT292	WIT13-01	PCBs (total)				JL	J
NOAA SiteChar	CH0003	CH01-03	PCBs (total)				JL	J
NOAA SiteChar	EST146	EST09-06	PCBs (total)				JL	J
NOAA SiteChar	WST338	WST12-02	PCBs (total)				JL	J
NOAA SiteChar	WST306	WST03-03	PCBs (total)				JL	J
NOAA SiteChar	WIT249	WIT03-01	PCBs (total)				JL	J
NOAA SiteChar	CH0006	CH02-02	PCBs (total)				JL	J
NOAA SiteChar	EST160	EST11-10	PCBs (total)				JL	J
NOAA SiteChar	WIT263	WIT06-02	PCBs (total)				JL	J
NOAA SiteChar	WST301	WST01-02	PCBs (total)				JL	J
NOAA SiteChar	EIT082	EIT11-01	PCBs (total)				JL	J
NOAA SiteChar	WST318	WST08-01	PCBs (total)				JL	J
NOAA SiteChar	CH0004	CH01-04	PCBs (total)				JL	J
NOAA SiteChar	WST310	WST04-03	PCBs (total)				JL	J
NOAA SiteChar	WST367	WST20-02	PCBs (total)				JL	J
NOAA SiteChar	EIT092	EIT14-01	PCBs (total)				JL	J
NOAA SiteChar	CH0005	CH02-01	PCBs (total)				JL	J
NOAA SiteChar	CH0011	CH03-03	PCBs (total)				JL	J
NOAA SiteChar	WST304	WST03-01	PCBs (total)				JL	J
NOAA SiteChar	CH0001	CH01-01	PCBs (total)				JL	J
NOAA SiteChar	WIT255	WIT03-06	PCBs (total)				JL	J
NOAA SiteChar	WST317	WST07-03	PCBs (total)				JL	J
NOAA SiteChar	CH0012	CH03-04	PCBs (total)				JL	J
NOAA SiteChar	WIT271	WIT08-03	PCBs (total)				JL	J
NOAA SiteChar	EIT054	EIT04-01	PCBs (total)				JL	J
NOAA SiteChar	WST308	WST04-01	PCBs (total)				JL	J
NOAA SiteChar	EST137	EST08-01	PCBs (total)				JL	J
NOAA SiteChar	CH0017	CH04-04	PCBs (total)				JL	J
NOAA SiteChar	WST305	WST03-02	PCBs (total)				JL	J
NOAA SiteChar	WST312	WST05-02	PCBs (total)				JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
NOAA SiteChar	EST111	EST04-01	PCBs (total)				JL	J
NOAA SiteChar	WIT248	WIT02-02	PCBs (total)				JL	J
NOAA SiteChar	WIT262	WIT06-01	PCBs (total)				JL	J
NOAA SiteChar	WIT296	WIT13-05	PCBs (total)				JL	J
NOAA SiteChar	WST300	WST01-01	PCBs (total)				JL	J
NOAA SiteChar	EST118	EST06-01	PCBs (total)				JL	J
NOAA SiteChar	WIT250	WIT03-02	PCBs (total)				JL	J
NOAA SiteChar	WIT260	WIT05-03	PCBs (total)				JL	J
NOAA SiteChar	WST309	WST04-02	PCBs (total)				JL	J
NOAA SiteChar	EST125	EST06-07	PCBs (total)				JL	J
NOAA SiteChar	EST112	EST04-02	PCBs (total)				JL	J
NOAA SiteChar	EIT059	EIT05-02	PCBs (total)				JL	J
NOAA SiteChar	EIT086	EIT12-02	PCBs (total)				JL	J
NOAA SiteChar	CH0010	CH03-02	PCBs (total)				JL	J
NOAA SiteChar	EIT051	EIT03-02	PCBs (total)				JL	J
NOAA SiteChar	EST125	EST06-07	PCBs (total)				JL	J
NOAA SiteChar	WIT256	WIT04-01	PCBs (total)				JL	J
NOAA SiteChar	EST120	EST06-02	PCBs (total)				JL	J
NOAA SiteChar	EST127	EST06-08	PCBs (total)				JL	J
NOAA SiteChar	EST136	EST07-08	PCBs (total)				JL	J
NOAA SiteChar	WIT281	WIT11-02	PCBs (total)				JL	J
NOAA SiteChar	WIT244	WIT01-03	PCBs (total)				JL	J
NOAA SiteChar	WIT261	WIT05-04	PCBs (total)				JL	J
NOAA SiteChar	WIT293	WIT13-02	PCBs (total)				JL	J
NOAA SiteChar	WST302	WST02-01	PCBs (total)				JL	J
NOAA SiteChar	EST135	EST07-07	PCBs (total)				JL	J
NOAA SiteChar	EST227	EST23-01	PCBs (total)				JL	J
NOAA SiteChar	EST117	EST05-02	PCBs (total)				JL	J
NOAA SiteChar	EST116	EST05-01	PCBs (total)				JL	J
NOAA SiteChar	EIT049	EIT03-01	PCBs (total)				JL	J
NOAA SiteChar	WIT295	WIT13-04	PCBs (total)				JL	J
NOAA SiteChar	WIT251	WIT03-03	PCBs (total)				JL	J
NOAA SiteChar	EIT088	EIT13-02	PCBs (total)				JL	J
NOAA SiteChar	EST105	EST03-01	PCBs (total)				JL	J
NOAA SiteChar	EIT095	EITUPRVR1	PCBs (total)				JL	J
NOAA SiteChar	EST101	EST01-03	PCBs (total)				JL	J
NOAA SiteChar	WIT289	WIT12-06	PCBs (total)				JL	J
NOAA SiteChar	WIT268	WIT07-03	PCBs (total)				JL	J
NOAA SiteChar	WIT247	WIT02-01	PCBs (total)				JL	J
NOAA SiteChar	EIT089	EIT13-03	PCBs (total)				JL	J
NOAA SiteChar	EST108	EST03-04	PCBs (total)				JL	J
NOAA SiteChar	WIT254	WIT03-05	PCBs (total)				JL	J
NOAA SiteChar	EST113	EST04-03	PCBs (total)				JL	J
NOAA SiteChar	WIT294	WIT13-03	PCBs (total)				JL	J
NOAA SiteChar	EST114	EST04-04	PCBs (total)				JL	J
NOAA SiteChar	EIT087	EIT13-01	PCBs (total)				JL	J
NOAA SiteChar	EST108	EST03-04	PCBs (total)				JL	J
NOAA SiteChar	EIT047	EIT02-02	PCBs (total)				JL	J
NOAA SiteChar	EIT045	EIT01-02	PCBs (total)				JL	J
NOAA SiteChar	WIT297	WIT13-06	PCBs (total)				JL	J
NOAA SiteChar	WIT299	WIT14-02	PCBs (total)				JL	J
NOAA SiteChar	EIT084	EIT11-03	PCBs (total)				JL	J
NOAA SiteChar	EST118	EST06-01	PCBs (total)				JL	J
NOAA SiteChar	EST121	EST06-03	PCBs (total)				JL	J
NOAA SiteChar	EST104	EST02-03	PCBs (total)				JL	J
NOAA SiteChar	EIT085	EIT12-01	PCBs (total)				JL	J
NOAA SiteChar	EIT089	EIT13-03	PCBs (total)				JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
NOAA SiteChar	EST122	EST06-04	PCBs (total)				JL	J
NOAA SiteChar	WIT242	WIT01-01	PCBs (total)				JL	J
NOAA SiteChar	WIT298	WIT14-01	PCBs (total)				JL	J
NOAA SiteChar	WIT246	WIT01-05	PCBs (total)				JL	J
NOAA SiteChar	EIT044	EIT01-01	PCBs (total)				JL	J
NOAA SiteChar	EIT089	EIT13-03	PCBs (total)				JL	J
NOAA SiteChar	EST103	EST02-02	PCBs (total)				JL	J
NOAA SiteChar	EST123	EST06-05	PCBs (total)				JL	J
NOAA SiteChar	EIT096	EITUPRVR2	PCBs (total)				JL	J
NOAA SiteChar	EST106	EST03-02	PCBs (total)				JL	J
NOAA SiteChar	EST098	EST01-01	PCBs (total)				JL	J
NOAA SiteChar	EST115	EST04-05	PCBs (total)				JL	J
NOAA SiteChar	EIT094	EIT14-02	PCBs (total)				JL	J
NOAA SiteChar	EST099	EST01-02	PCBs (total)				JL	J
NOAA SiteChar	EST138	EST08-02	PCBs (total)	U		U	JL	UJ
NOAA SiteChar	EST233	ESTUPRVR	PCBs (total)	U		U	JL	UJ
NOAA SiteChar	EST102	EST01-04	PCBs (total)	U		U	JL	UJ
NOAA SiteChar	EST107	EST03-03	PCBs (total)	U		U	JL	UJ
Norfolk-monit5	NFK501	L23995-1	1,4-Dichlorobenzene		U	BU		
Norfolk-monit5	NFK504	L23995-7	1,4-Dichlorobenzene		U	BU		
Norfolk-monit5	NFK504	L23995-8	1,4-Dichlorobenzene		U	BU		
Norfolk-monit5	NFK503	L23995-5	1,4-Dichlorobenzene		U	BU		
Norfolk-monit5	NFK502	L23995-4	1,4-Dichlorobenzene		U	BU		
Norfolk-monit5	NFK503	L23995-6	1,4-Dichlorobenzene		U	BU		
Norfolk-monit5	NFK502	L23995-3	1,4-Dichlorobenzene		U	BU		
Norfolk-monit5	NFK502	L23995-4	Aluminum		JH	J		
Norfolk-monit5	NFK503	L23995-5	Aluminum		JH	J		
Norfolk-monit5	NFK501	L23995-2	Aluminum		JH	J		
Norfolk-monit5	NFK502	L23995-3	Aluminum		JH	J		
Norfolk-monit5	NFK504	L23995-8	Aluminum		JH	J		
Norfolk-monit5	NFK504	L23995-7	Aluminum		JH	J		
Norfolk-monit5	NFK503	L23995-6	Aluminum		JH	J		
Norfolk-monit5	NFK501	L23995-1	Aluminum		JH	J		
Norfolk-monit5	NFK502	L23995-3	Aniline		UJL	UJ		
Norfolk-monit5	NFK504	L23995-7	Aniline		UJL	UJ		
Norfolk-monit5	NFK501	L23995-1	Aniline		UJL	UJ		
Norfolk-monit5	NFK501	L23995-2	Aniline		UJL	UJ		
Norfolk-monit5	NFK503	L23995-6	Aniline		UJL	UJ		
Norfolk-monit5	NFK503	L23995-5	Aniline		UJL	UJ		
Norfolk-monit5	NFK504	L23995-8	Aniline		UJL	UJ		
Norfolk-monit5	NFK502	L23995-4	Aniline		UJL	UJ		
Norfolk-monit5	NFK503	L23995-5	Anthracene		JL	J		
Norfolk-monit5	NFK501	L23995-2	Anthracene		JL	J		
Norfolk-monit5	NFK504	L23995-8	Anthracene		JL	J		
Norfolk-monit5	NFK503	L23995-6	Anthracene		JL	J		
Norfolk-monit5	NFK501	L23995-1	Anthracene		JL	J		
Norfolk-monit5	NFK504	L23995-7	Anthracene		JL	J		
Norfolk-monit5	NFK502	L23995-4	Anthracene		UJL	UJ		
Norfolk-monit5	NFK502	L23995-3	Anthracene		UJL	UJ		
Norfolk-monit5	NFK501	L23995-2	Aroclor-1260		JK	J		
Norfolk-monit5	NFK503	L23995-5	Aroclor-1260		JK	J		
Norfolk-monit5	NFK504	L23995-8	Aroclor-1260		JK	J		
Norfolk-monit5	NFK504	L23995-7	Aroclor-1260		JK	J		
Norfolk-monit5	NFK503	L23995-6	Aroclor-1260		JK	J		
Norfolk-monit5	NFK501	L23995-1	Aroclor-1260		JK	J		
Norfolk-monit5	NFK502	L23995-3	Aroclor-1260		UJK	UJ		

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Norfolk-monit5	NFK502	L23995-4	Aroclor-1260		UJK	UJ		
Norfolk-monit5	NFK503	L23995-5	Benzo(g,h,i)perylene		JL	J		
Norfolk-monit5	NFK503	L23995-6	Benzo(g,h,i)perylene		JL	J		
Norfolk-monit5	NFK504	L23995-8	Benzo(g,h,i)perylene		JL	J		
Norfolk-monit5	NFK501	L23995-1	Benzo(g,h,i)perylene		JL	J		
Norfolk-monit5	NFK501	L23995-2	Benzo(g,h,i)perylene		JL	J		
Norfolk-monit5	NFK504	L23995-7	Benzo(g,h,i)perylene		JL	J		
Norfolk-monit5	NFK502	L23995-4	Benzo(g,h,i)perylene		UJL	UJ		
Norfolk-monit5	NFK502	L23995-3	Benzo(g,h,i)perylene		UJL	UJ		
Norfolk-monit5	NFK502	L23995-4	Bis(2-ethylhexyl)phthalate		U	BU		
Norfolk-monit5	NFK502	L23995-3	Bis(2-ethylhexyl)phthalate		U	BU		
Norfolk-monit5	NFK501	L23995-2	Bis(2-ethylhexyl)phthalate		U	BU		
Norfolk-monit5	NFK504	L23995-7	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK501	L23995-1	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK504	L23995-8	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK503	L23995-6	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK503	L23995-5	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK501	L23995-2	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK502	L23995-4	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK502	L23995-3	Butyl benzyl phthalate		U	BU		
Norfolk-monit5	NFK501	L23995-2	Coprostanol		JL	J		
Norfolk-monit5	NFK503	L23995-6	Coprostanol		JL	J		
Norfolk-monit5	NFK501	L23995-1	Coprostanol		JL	J		
Norfolk-monit5	NFK503	L23995-5	Coprostanol		JL	J		
Norfolk-monit5	NFK504	L23995-7	Coprostanol		UJL	UJ		
Norfolk-monit5	NFK504	L23995-8	Coprostanol		UJL	UJ		
Norfolk-monit5	NFK502	L23995-4	Coprostanol		UJL	UJ		
Norfolk-monit5	NFK502	L23995-3	Coprostanol		UJL	UJ		
Norfolk-monit5	NFK503	L23995-5	Indeno(1,2,3-cd)pyrene		JL	J		
Norfolk-monit5	NFK503	L23995-6	Indeno(1,2,3-cd)pyrene		JL	J		
Norfolk-monit5	NFK504	L23995-8	Indeno(1,2,3-cd)pyrene		JL	J		
Norfolk-monit5	NFK501	L23995-1	Indeno(1,2,3-cd)pyrene		JL	J		
Norfolk-monit5	NFK504	L23995-7	Indeno(1,2,3-cd)pyrene		JL	J		
Norfolk-monit5	NFK501	L23995-2	Indeno(1,2,3-cd)pyrene		JL	J		
Norfolk-monit5	NFK502	L23995-4	Indeno(1,2,3-cd)pyrene		UJL	UJ		
Norfolk-monit5	NFK502	L23995-3	Indeno(1,2,3-cd)pyrene		UJL	UJ		
Norfolk-monit5	NFK501	L23995-1	Iron		JL	J		
Norfolk-monit5	NFK503	L23995-5	Iron		JL	J		
Norfolk-monit5	NFK503	L23995-6	Iron		JL	J		
Norfolk-monit5	NFK504	L23995-7	Iron		JL	J		
Norfolk-monit5	NFK501	L23995-2	Iron		JL	J		
Norfolk-monit5	NFK502	L23995-3	Iron		JL	J		
Norfolk-monit5	NFK504	L23995-8	Iron		JL	J		
Norfolk-monit5	NFK502	L23995-4	Iron		JL	J		
Norfolk-monit5	NFK502	L23995-4	Naphthalene		UJL	UJ		
Norfolk-monit5	NFK501	L23995-1	Naphthalene		UJL	UJ		
Norfolk-monit5	NFK501	L23995-2	Naphthalene		UJL	UJ		
Norfolk-monit5	NFK504	L23995-8	Naphthalene		UJL	UJ		
Norfolk-monit5	NFK504	L23995-7	Naphthalene		UJL	UJ		
Norfolk-monit5	NFK503	L23995-6	Naphthalene		UJL	UJ		
Norfolk-monit5	NFK503	L23995-5	Naphthalene		UJL	UJ		
Norfolk-monit5	NFK502	L23995-3	Naphthalene		UJL	UJ		
Norfolk-monit6	NFK502	L28052-3	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-2	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-8	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-6	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-7	2,4-Dimethylphenol	UX		U	R	UR

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Norfolk-monit6	NFK501	L28052-1	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-5	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-4	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-1	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-2	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-6	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-7	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-3	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-5	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-8	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-4	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-1	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-8	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-2	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-6	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-5	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-7	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-4	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-3	3-Nitroaniline	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-2	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-4	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-8	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-7	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-3	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-5	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-1	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-6	4-Chloroaniline	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-5	4-Methylphenol	G		J	JL	J
Norfolk-monit6	NFK504	L28052-7	Aluminum	L		J	JH	J
Norfolk-monit6	NFK503	L28052-5	Aluminum	L		J	JH	J
Norfolk-monit6	NFK502	L28052-3	Aluminum	L		J	JH	J
Norfolk-monit6	NFK501	L28052-1	Aluminum	L		J	JH	J
Norfolk-monit6	NFK504	L28052-8	Aluminum	L		J	JH	J
Norfolk-monit6	NFK502	L28052-4	Aluminum	L		J	JH	J
Norfolk-monit6	NFK503	L28052-6	Aluminum	L		J	JH	J
Norfolk-monit6	NFK501	L28052-1	Aniline	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-2	Aniline	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-8	Aniline	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-5	Aniline	UX		U	R	UR
Norfolk-monit6	NFK503	L28052-6	Aniline	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-4	Aniline	UX		U	R	UR
Norfolk-monit6	NFK504	L28052-7	Aniline	UX		U	R	UR
Norfolk-monit6	NFK502	L28052-3	Aniline	UX		U	R	UR
Norfolk-monit6	NFK501	L28052-1	Anthracene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Anthracene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Anthracene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Benzo(a)anthracene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Benzo(a)anthracene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-8	Benzo(a)anthracene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-4	Benzo(a)anthracene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Benzo(a)anthracene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-3	Benzo(a)anthracene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-7	Benzo(a)anthracene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Benzo(a)pyrene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-8	Benzo(a)pyrene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Benzo(a)pyrene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Benzo(a)pyrene	G		J	JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Norfolk-monit6	NFK502	L28052-4	Benzo(a)pyrene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-7	Benzo(a)pyrene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-3	Benzo(a)pyrene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Benzo(g,h,i)perylene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Benzo(g,h,i)perylene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-4	Benzo(g,h,i)perylene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Benzo(g,h,i)perylene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Benzo(k)fluoranthene	L		J	JH	J
Norfolk-monit6	NFK503	L28052-5	Benzo(k)fluoranthene	L		J	JH	J
Norfolk-monit6	NFK504	L28052-7	Benzo(k)fluoranthene	L		J	JH	J
Norfolk-monit6	NFK504	L28052-8	Benzo(k)fluoranthene	L		J	JH	J
Norfolk-monit6	NFK503	L28052-6	Benzo(k)fluoranthene	L		J	JH	J
Norfolk-monit6	NFK502	L28052-3	Benzo(k)fluoranthene	L		J	JH	J
Norfolk-monit6	NFK502	L28052-4	Benzo(k)fluoranthene	L		J	JH	J
Norfolk-monit6	NFK504	L28052-8	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit6	NFK503	L28052-5	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit6	NFK502	L28052-3	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit6	NFK504	L28052-7	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit6	NFK503	L28052-6	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit6	NFK501	L28052-1	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit6	NFK502	L28052-4	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit6	NFK503	L28052-5	Butyl benzyl phthalate	B			U	BU
Norfolk-monit6	NFK504	L28052-8	Butyl benzyl phthalate	B			U	BU
Norfolk-monit6	NFK503	L28052-6	Butyl benzyl phthalate	B			U	BU
Norfolk-monit6	NFK502	L28052-3	Butyl benzyl phthalate	B			U	BU
Norfolk-monit6	NFK501	L28052-2	Butyl benzyl phthalate	B			U	BU
Norfolk-monit6	NFK501	L28052-1	Butyl benzyl phthalate	B			U	BU
Norfolk-monit6	NFK502	L28052-4	Butyl benzyl phthalate	G		J	JL	J
Norfolk-monit6	NFK502	L28052-4	Chrysene	E		J	JK	J
Norfolk-monit6	NFK501	L28052-1	Chrysene	E		J	JK	J
Norfolk-monit6	NFK503	L28052-5	Chrysene	E		J	JK	J
Norfolk-monit6	NFK504	L28052-8	Chrysene	E		J	JK	J
Norfolk-monit6	NFK503	L28052-6	Chrysene	E		J	JK	J
Norfolk-monit6	NFK504	L28052-7	Chrysene	E		J	JK	J
Norfolk-monit6	NFK502	L28052-3	Chrysene	E		J	JK	J
Norfolk-monit6	NFK504	L28052-7	Di-n-butyl phthalate	B			U	BU
Norfolk-monit6	NFK502	L28052-3	Di-n-butyl phthalate	B			U	BU
Norfolk-monit6	NFK503	L28052-6	Di-n-butyl phthalate	B			U	BU
Norfolk-monit6	NFK503	L28052-5	Di-n-butyl phthalate	B			U	BU
Norfolk-monit6	NFK502	L28052-4	Di-n-butyl phthalate	B			U	BU
Norfolk-monit6	NFK501	L28052-1	Di-n-butyl phthalate	B			U	BU
Norfolk-monit6	NFK504	L28052-8	Di-n-butyl phthalate	B			U	BU
Norfolk-monit6	NFK503	L28052-6	Fluoranthene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-8	Fluoranthene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Fluoranthene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-4	Fluoranthene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Fluoranthene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-7	Fluoranthene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-3	Fluoranthene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Indeno(1,2,3-cd)pyrene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Indeno(1,2,3-cd)pyrene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Indeno(1,2,3-cd)pyrene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Iron	G		J	JL	J
Norfolk-monit6	NFK502	L28052-3	Iron	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Iron	G		J	JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Norfolk-monit6	NFK504	L28052-8	Iron	G		J	JL	J
Norfolk-monit6	NFK502	L28052-4	Iron	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Iron	G		J	JL	J
Norfolk-monit6	NFK504	L28052-7	Iron	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Phenanthrene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-8	Phenanthrene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Phenanthrene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Phenanthrene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-4	Phenanthrene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-7	Phenanthrene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-3	Phenanthrene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-6	Pyrene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-8	Pyrene	G		J	JL	J
Norfolk-monit6	NFK501	L28052-1	Pyrene	G		J	JL	J
Norfolk-monit6	NFK503	L28052-5	Pyrene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-4	Pyrene	G		J	JL	J
Norfolk-monit6	NFK502	L28052-3	Pyrene	G		J	JL	J
Norfolk-monit6	NFK504	L28052-7	Pyrene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-5	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-4	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-6	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-3	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-1	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-8	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-2	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-7	2,4-Dimethylphenol	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-7	2-Methylnaphthalene	G		J	JL	J
Norfolk-monit7	NFK502	L31635-3	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-1	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-5	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-6	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-7	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-8	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-4	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-2	3,3'-Dichlorobenzidine	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-8	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-2	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-4	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-7	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-3	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-1	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-5	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-6	3-Nitroaniline	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-3	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-7	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-8	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-2	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-1	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-6	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-4	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-5	4-Chloroaniline	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-3	Aluminum	L		J	JH	J
Norfolk-monit7	NFK501	L31635-1	Aluminum	L		J	JH	J
Norfolk-monit7	NFK504	L31635-8	Aluminum	L		J	JH	J
Norfolk-monit7	NFK503	L31635-5	Aluminum	L		J	JH	J
Norfolk-monit7	NFK503	L31635-6	Aluminum	L		J	JH	J
Norfolk-monit7	NFK501	L31635-2	Aluminum	L		J	JH	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Norfolk-monit7	NFK504	L31635-7	Aluminum	L		J	JH	J
Norfolk-monit7	NFK502	L31635-4	Aluminum	L		J	JH	J
Norfolk-monit7	NFK504	L31635-7	Aniline	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-1	Aniline	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-3	Aniline	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-6	Aniline	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-8	Aniline	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-2	Aniline	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-4	Aniline	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-5	Aniline	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-7	Anthracene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-5	Anthracene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-6	Anthracene	G		J	JL	J
Norfolk-monit7	NFK501	L31635-1	Anthracene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-6	Aroclor-1254	L		J	JH	J
Norfolk-monit7	NFK504	L31635-7	Aroclor-1254	L		J	JH	J
Norfolk-monit7	NFK501	L31635-2	Aroclor-1254	L		J	JH	J
Norfolk-monit7	NFK503	L31635-5	Aroclor-1254	L		J	JH	J
Norfolk-monit7	NFK501	L31635-1	Aroclor-1254	L		J	JH	J
Norfolk-monit7	NFK503	L31635-5	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK503	L31635-6	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK501	L31635-1	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK501	L31635-2	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK502	L31635-4	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-8	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-7	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK502	L31635-3	Benzo(a)anthracene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-7	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK502	L31635-3	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK501	L31635-2	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK501	L31635-1	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK504	L31635-8	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK503	L31635-6	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK503	L31635-5	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK502	L31635-4	Benzo(a)pyrene	EG		J	JL	J
Norfolk-monit7	NFK503	L31635-6	Benzo(k)fluoranthene	E		J	JK	J
Norfolk-monit7	NFK503	L31635-5	Benzo(k)fluoranthene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-8	Benzo(k)fluoranthene	E		J	JK	J
Norfolk-monit7	NFK501	L31635-2	Benzo(k)fluoranthene	E		J	JK	J
Norfolk-monit7	NFK501	L31635-1	Benzo(k)fluoranthene	E		J	JK	J
Norfolk-monit7	NFK502	L31635-3	Benzo(k)fluoranthene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-7	Benzo(k)fluoranthene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-7	Benzoic acid	B			U	BU
Norfolk-monit7	NFK504	L31635-8	Benzoic acid	B			U	BU
Norfolk-monit7	NFK503	L31635-6	Benzoic acid	B			U	BU
Norfolk-monit7	NFK503	L31635-5	Benzoic acid	B			U	BU
Norfolk-monit7	NFK501	L31635-1	Benzoic acid	B			U	BU
Norfolk-monit7	NFK502	L31635-3	Benzoic acid	B			U	BU
Norfolk-monit7	NFK501	L31635-2	Benzoic acid	BG		J	U	BUJ
Norfolk-monit7	NFK502	L31635-4	Benzoic acid	BU		U	U	BU
Norfolk-monit7	NFK502	L31635-3	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit7	NFK501	L31635-2	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit7	NFK504	L31635-7	Bis(2-ethylhexyl)phthalate	B				
Norfolk-monit7	NFK504	L31635-8	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit7	NFK503	L31635-6	Bis(2-ethylhexyl)phthalate	B				
Norfolk-monit7	NFK501	L31635-1	Bis(2-ethylhexyl)phthalate	B				
Norfolk-monit7	NFK502	L31635-4	Bis(2-ethylhexyl)phthalate	B			U	BU
Norfolk-monit7	NFK503	L31635-5	Bis(2-ethylhexyl)phthalate	B				

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Norfolk-monit7	NFK503	L31635-6	Chrysene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-8	Chrysene	E		J	JK	J
Norfolk-monit7	NFK503	L31635-5	Chrysene	E		J	JK	J
Norfolk-monit7	NFK501	L31635-1	Chrysene	E		J	JK	J
Norfolk-monit7	NFK501	L31635-2	Chrysene	E		J	JK	J
Norfolk-monit7	NFK502	L31635-3	Chrysene	E		J	JK	J
Norfolk-monit7	NFK504	L31635-7	Chrysene	E		J	JK	J
Norfolk-monit7	NFK501	L31635-1	Indeno(1,2,3-cd)pyrene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-6	Indeno(1,2,3-cd)pyrene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-5	Indeno(1,2,3-cd)pyrene	G		J	JL	J
Norfolk-monit7	NFK504	L31635-7	Indeno(1,2,3-cd)pyrene	G		J	JL	J
Norfolk-monit7	NFK501	L31635-2	Mercury	EG		J	JL	J
Norfolk-monit7	NFK504	L31635-7	Naphthalene	G		J	JL	J
Norfolk-monit7	NFK504	L31635-8	Phenanthrene	G		J	JL	J
Norfolk-monit7	NFK501	L31635-1	Phenanthrene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-5	Phenanthrene	G		J	JL	J
Norfolk-monit7	NFK503	L31635-6	Phenanthrene	G		J	JL	J
Norfolk-monit7	NFK504	L31635-7	Phenanthrene	G		J	JL	J
Norfolk-monit7	NFK501	L31635-2	Phenanthrene	G		J	JL	J
Norfolk-monit7	NFK501	L31635-1	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK504	L31635-7	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK501	L31635-2	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK504	L31635-8	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK502	L31635-3	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK503	L31635-6	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK503	L31635-5	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK502	L31635-4	Pyrene	EG		J	JL	J
Norfolk-monit7	NFK503	L31635-5	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK503	L31635-6	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-7	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-4	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-1	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK502	L31635-3	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-2	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK504	L31635-8	Pyridine	UX		U	R	UR
Norfolk-monit7	NFK501	L31635-1	Silver	L		J	JH	J
Norfolk-monit7	NFK503	L31635-5	Silver	L		J	JH	J
Norfolk-monit7	NFK504	L31635-8	Silver	L		J	JH	J
Norfolk-monit7	NFK502	L31635-3	Silver	L		J	JH	J
Norfolk-monit7	NFK501	L31635-2	Silver	L		J	JH	J
Norfolk-monit7	NFK504	L31635-7	Silver	L		J	JH	J
Norfolk-monit7	NFK503	L31635-6	Silver	L		J	JH	J
Norfolk-monit7	NFK502	L31635-4	Silver	L		J	JH	J
Plant 2 RFI-1	SS-SWY04	SS-SWY04	Antimony	J-		J	JL	J
Plant 2 RFI-1	SD-SWY12	SD-SWY12-0000	Antimony	J-		J	JL	J
Plant 2 RFI-1	SD-SWY03	SD-SWY03-0000	Antimony	J-		J	JL	J
Plant 2 RFI-1	SD-SWY09	SD-SWY09-0000	Antimony	J-		J	JL	J
Plant 2 RFI-1	SD-SWY04	SD-SWY04-0000	Antimony	J-		J	JL	J
Plant 2 RFI-1	SD-04122	SD-04122-0000	Antimony	J-		J	JL	J
Plant 2 RFI-1	SD-SWY13	SD-SWY13-0000	Antimony	J-		J	JL	J
Plant 2 RFI-1	SS-SWY06	SS-SWY06	Antimony	J-		J	JL	J
Plant 2 RFI-1	SD-SWY05	SD-SWY05-0000	Barium	J+		J	JH	J
Plant 2 RFI-1	SD-04113	SD-04113-0000	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0000	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04108	SD-04108-0000	Calcium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY06	SS-SWY06	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04109	SD-04109-0000	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04111	SD-04111-0000	Calcium	J+		J	JH	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Plant 2 RFI-1	SD-04112	SD-04112-0000	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0003	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-SWY05	SD-SWY05-0000	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04110	SD-04110-0000	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0015	Calcium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY05	SS-SWY05	Calcium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY04	SS-SWY04	Calcium	J+		J	JH	J
Plant 2 RFI-1	SD-04113	SD-04113-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04108	SD-04108-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04109	SD-04109-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY06	SS-SWY06	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04110	SD-04110-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04112	SD-04112-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0003	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-SWY05	SD-SWY05-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04111	SD-04111-0000	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0015	Chromium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY04	SS-SWY04	Chromium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY05	SS-SWY05	Chromium	J+		J	JH	J
Plant 2 RFI-1	SD-04113	SD-04113-0000	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04109	SD-04109-0000	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04108	SD-04108-0000	Copper	J+		J	JH	J
Plant 2 RFI-1	SS-SWY06	SS-SWY06	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0000	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04112	SD-04112-0000	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04111	SD-04111-0000	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0003	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04110	SD-04110-0000	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0015	Copper	J+		J	JH	J
Plant 2 RFI-1	SS-SWY05	SS-SWY05	Copper	J+		J	JH	J
Plant 2 RFI-1	SS-SWY04	SS-SWY04	Copper	J+		J	JH	J
Plant 2 RFI-1	SD-04109	SD-04109-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04108	SD-04108-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04113	SD-04113-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SS-SWY06	SS-SWY06	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04110	SD-04110-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-SWY05	SD-SWY05-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04112	SD-04112-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0003	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0015	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04111	SD-04111-0000	Lead	J+		J	JH	J
Plant 2 RFI-1	SS-SWY05	SS-SWY05	Lead	J+		J	JH	J
Plant 2 RFI-1	SS-SWY04	SS-SWY04	Lead	J+		J	JH	J
Plant 2 RFI-1	SD-04113	SD-04113-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04108	SD-04108-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY06	SS-SWY06	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04111	SD-04111-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04112	SD-04112-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-SWY05	SD-SWY05-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0003	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04110	SD-04110-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY04	SS-SWY04	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SS-SWY05	SS-SWY05	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0015	Magnesium	J+		J	JH	J
Plant 2 RFI-1	SD-04109	SD-04109-0000	Magnesium	J+		J	JH	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Plant 2 RFI-1	SD-SWY05	SD-SWY05-0000	Nickel	J+		J	JH	J
Plant 2 RFI-1	SD-SWY05	SD-SWY05-0000	Sodium	J+		J	JH	J
Plant 2 RFI-1	SD-04108	SD-04108-0000	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04113	SD-04113-0000	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04109	SD-04109-0000	Zinc	J+		J	JH	J
Plant 2 RFI-1	SS-SWY06	SS-SWY06	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0000	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04112	SD-04112-0000	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0003	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04110	SD-04110-0000	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04107	SD-04107-0015	Zinc	J+		J	JH	J
Plant 2 RFI-1	SD-04111	SD-04111-0000	Zinc	J+		J	JH	J
Plant 2 RFI-1	SS-SWY05	SS-SWY05	Zinc	J+		J	JH	J
Plant 2 RFI-1	SS-SWY04	SS-SWY04	Zinc	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW28	SD-DUW28-0000	Chromium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW27	SD-DUW27-0000	Chromium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW28	SD-DUW28-1000	Chromium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW34	SD-DUW34-1000	Chromium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW34	SD-DUW34-0000	Chromium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW22	SD-DUW22-0000	Copper	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW33	SD-DUW33-0000	Copper	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW25	SD-DUW25-0000	Copper	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW34	SD-DUW34-1000	Magnesium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW28	SD-DUW28-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW27	SD-DUW27-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW28	SD-DUW28-1000	Magnesium	J+		J	JH	J
Plant 2 RFI-2a	SD-DUW34	SD-DUW34-0000	Magnesium	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW73	SD2B-DUW73-0000	Antimony	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW90	SD2B-DUW90-0000	Antimony	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW82	SD2B-DUW82-0000	Antimony	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW89	SD2B-DUW89-0000	Antimony	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW69	SD2B-DUW69-0000	Antimony	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-0026	Calcium	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-0000C	Calcium	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-1026	Calcium	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-1000C	Calcium	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW13	SD2B-DUW13-0000C	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0120	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW13D	SD2B-DUW13-5000C	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW13	SD2B-DUW13-0040	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW13D	SD2B-DUW13-5040	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0040	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0000C	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW28	SD2B-DUW28-0019	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW28	SD2B-DUW28-0000C	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0080	Chromium	J-		J	JL	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-0026	Copper	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-0000C	Copper	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-1026	Copper	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW51	SD2B-DUW51-1000C	Copper	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW13	SD2B-DUW13-0040	Mercury	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW13D	SD2B-DUW13-5040	Mercury	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW13D	SD2B-DUW13-5000C	Mercury	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0120	Mercury	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0000C	Mercury	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0080	Mercury	J+		J	JH	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Plant 2 RFI-2b	SD-DUW13	SD2B-DUW13-0000C	Mercury	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW53	SD2B-DUW53-0040	Mercury	J+		J	JH	J
Plant 2 RFI-2b	SD-DUW28	SD2B-DUW28-0000C	Mercury	J+		J	JH	J
Plant 2-TransformerPhase1	SD-DUW155	DUW155-0000	Aroclor-1260		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW156	DUW156-0020	Aroclor-1260		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW164	DUW164-0030	Aroclor-1260	P	J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW154	DUW154-0000	Aroclor-1260	P	J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW157	DUW157D-0020	Aroclor-1260				JK	J
Plant 2-TransformerPhase1	SD-SWY17	SWY17	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW160	DUW160-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW161	DUW161-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW162	DUW162-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW163	DUW163-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW164	DUW164-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW165	DUW165-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-SWY14	SWY14	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-SWY16	SWY16	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW159	DUW159-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-SWY19	SWY19	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW153	DUW153-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW154	DUW154-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW155	DUW155-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW156	DUW156-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW157	DUW157-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW158	DUW158-0000	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-SWY15	SWY15	Fractional % phi 4-5 (31.2-62		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW157	DUW157D-0000	Fractional % phi 4-5 (31.2-62.5µm)				JK	J
Plant 2-TransformerPhase1	SD-DUW157	DUW157-0000	Total Organic Carbon (TOC)		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW157	DUW157-0030	Total Organic Carbon (TOC)		J	J	JK	J
Plant 2-TransformerPhase1	SD-DUW157	DUW157-0040	Total Organic Carbon (TOC)		J	J	JK	J
PSDDA99	S14	S14	1,2,4-Trichlorobenzene	U		UJ	UJK	UJ
PSDDA99	S14	S14	1,2-Dichlorobenzene	U		UJ	UJK	UJ
PSDDA99	S14	S14	1,3-Dichlorobenzene	U		UJ	UJK	UJ
PSDDA99	S14	S14	1,4-Dichlorobenzene	U		UJ	UJK	UJ
PSDDA99	S14	S14	2,4-Dimethylphenol	U		UJ	UJK	UJ
PSDDA99	S14	S14	2-Methylnaphthalene	U		UJ	UJK	UJ
PSDDA99	S14	S14	2-Methylphenol	U		UJ	UJK	UJ
PSDDA99	S14	S14	4-Methylphenol	U		UJ	UJK	UJ
PSDDA99	B1	B1	Acenaphthene	J		J	JK	J
PSDDA99	S14	S14	Acenaphthene	U		UJ	UJK	UJ
PSDDA99	S4	S4	Acenaphthene	J		J	JK	J
PSDDA99	S14	S14	Acenaphthylene	U		UJ	UJK	UJ
PSDDA99	S14	S14	Anthracene			J	JK	J
PSDDA99	B1	B1	Antimony	U		UJ	R	UR
PSDDA99	B2	B2	Antimony	U		UJ	R	UR
PSDDA99	S1	S1	Antimony	U		UJ	R	UR
PSDDA99	S10	S10	Antimony	U		UJ	R	UR
PSDDA99	S13	S13	Antimony	U		UJ	R	UR
PSDDA99	S14	S14	Antimony	U		UJ	R	UR
PSDDA99	S15	S15	Antimony	U		UJ	R	UR
PSDDA99	S16	S16	Antimony	U		UJ	R	UR
PSDDA99	S17	S17	Antimony	U		UJ	R	UR
PSDDA99	S18	S18	Antimony	U		UJ	R	UR
PSDDA99	S2	S2	Antimony	U		UJ	R	UR
PSDDA99	S3	S3	Antimony	U		UJ	R	UR
PSDDA99	S4	S4	Antimony	U		UJ	R	UR

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
PSDDA99	S5	S5	Antimony	U		UJ	R	UR
PSDDA99	S6	S6	Antimony	U		UJ	R	UR
PSDDA99	S7	S7	Antimony	U		UJ	R	UR
PSDDA99	S8	S8	Antimony	U		UJ	R	UR
PSDDA99	S9	S9	Antimony	U		UJ	R	UR
PSDDA99	S14	S14	Benzo(a)anthracene			J	JK	J
PSDDA99	S14	S14	Benzo(a)pyrene			J	JK	J
PSDDA99	S14	S14	Benzo(b)fluoranthene			J	JK	J
PSDDA99	S14	S14	Benzo(g,h,i)perylene			J	JK	J
PSDDA99	S14	S14	Benzo(k)fluoranthene			J	JK	J
PSDDA99	S14	S14	Benzofluoranthenes (total-calc'd)			J	JK	J
PSDDA99	S14	S14	Benzoic acid	U		UJ	UJK	UJ
PSDDA99	S14	S14	Benzyl alcohol	U		UJ	UJK	UJ
PSDDA99	S14	S14	Bis(2-ethylhexyl)phthalate			J	JK	J
PSDDA99	B1	B1	Butyl benzyl phthalate	J		J	JK	J
PSDDA99	S14	S14	Butyl benzyl phthalate	U		UJ	UJK	UJ
PSDDA99	S8	S8	Butyl benzyl phthalate	J		J	JK	J
PSDDA99	S14	S14	Chrysene			J	JK	J
PSDDA99	S10	S10	Dibenzo(a,h)anthracene	J		J	JK	J
PSDDA99	S14	S14	Dibenzo(a,h)anthracene			J	JK	J
PSDDA99	S1	S1	Dibenzofuran	J		J	JK	J
PSDDA99	S14	S14	Dibenzofuran	U		UJ	UJK	UJ
PSDDA99	S14	S14	Diethyl phthalate	U		UJ	UJK	UJ
PSDDA99	S14	S14	Dimethyl phthalate	U		UJ	UJK	UJ
PSDDA99	S14	S14	Di-n-butyl phthalate	U		UJ	UJK	UJ
PSDDA99	S14	S14	Di-n-octyl phthalate	U		UJ	UJK	UJ
PSDDA99	S14	S14	Fluoranthene			J	JK	J
PSDDA99	S14	S14	Fluorene	U		UJ	UJK	UJ
PSDDA99	S3	S3	Fluorene	J		J	JK	J
PSDDA99	S14	S14	Hexachlorobenzene	U		UJ	UJK	UJ
PSDDA99	S14	S14	Hexachlorobutadiene	U		UJ	UJK	UJ
PSDDA99	S14	S14	Hexachloroethane	U		UJ	UJK	UJ
PSDDA99	S14	S14	Indeno(1,2,3-cd)pyrene			J	JK	J
PSDDA99	S14	S14	Naphthalene	U		UJ	UJK	UJ
PSDDA99	S14	S14	N-Nitrosodiphenylamine	U		UJ	UJK	UJ
PSDDA99	B2	B2	PCB-169	J		J	JK	J
PSDDA99	S14	S14	Pentachlorophenol	U		UJ	UJK	UJ
PSDDA99	S14	S14	Phenanthrene			J	JK	J
PSDDA99	S1	S1	Phenol	J		J	JK	J
PSDDA99	S14	S14	Phenol			J	JK	J
PSDDA99	S14	S14	Pyrene			J	JK	J
PSDDA99	B1	B1	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	B2	B2	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S1	S1	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S10	S10	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S13	S13	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S14	S14	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S15	S15	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S16	S16	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S2	S2	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S3	S3	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S4	S4	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S5	S5	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S6	S6	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S7	S7	Total Organic Carbon (TOC)			J	JK	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
PSDDA99	S8	S8	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	S9	S9	Total Organic Carbon (TOC)			J	JK	J
PSDDA99	B2	B2	Tributyltin as ion	M		J	JK	J
PSDDA99	S1	S1	Tributyltin as ion	M		J	JK	J
PSDDA99	S10	S10	Tributyltin as ion	M		J	JK	J
PSDDA99	S13	S13	Tributyltin as ion	MJ		J	JK	J
PSDDA99	S14	S14	Tributyltin as ion	MJ		J	JK	J
PSDDA99	S16	S16	Tributyltin as ion	M		J	JK	J
PSDDA99	S17	S17	Tributyltin as ion	MJ		J	JK	J
PSDDA99	S18	S18	Tributyltin as ion	MJ		J	JK	J
PSDDA99	S2	S2	Tributyltin as ion	MJ		J	JK	J
PSDDA99	S4	S4	Tributyltin as ion	M		J	JK	J
PSDDA99	S5	S5	Tributyltin as ion	MJ		J	JK	J
PSDDA99	S6	S6	Tributyltin as ion	MJ		J	JK	J
PSDDA99	S7	S7	Tributyltin as ion	M		J	JK	J
PSDDA99	S8	S8	Tributyltin as ion	M		J	JK	J
PSDDA99	S9	S9	Tributyltin as ion	MJ		J	JK	J
Turning-basin	DTB-04SD	DTB-04SD	1,2,4-Trichlorobenzene	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	1,2-Dichlorobenzene	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	1,3-Dichlorobenzene	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	1,4-Dichlorobenzene	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	2,4-Dimethylphenol	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	2-Methylnaphthalene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	2-Methylphenol	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	4-Methylphenol	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Acenaphthene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Acenaphthylene	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Anthracene	J-		J	JL	J
Turning-basin	DTB-05SD	DTB-05SD	Antimony	B		UJ	UJL	UJ
Turning-basin	DTB-02SD	DTB-02SD	Antimony	B		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Antimony	B		UJ	UJL	UJ
Turning-basin	DTB-01SD	DTB-01SD	Antimony	B		UJ	UJL	UJ
Turning-basin	DTB-03SD	DTB-03SD	Antimony	B		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Benzo(a)anthracene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Benzo(a)pyrene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Benzo(g,h,i)perylene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Benzoic acid	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Benzyl alcohol	UJ-		UJ	UJL	UJ
Turning-basin	DTB-05SD	DTB-05SD	Bis(2-ethylhexyl)phthalate	B		UJ	U	BU
Turning-basin	DTB-02SD	DTB-02SD	Bis(2-ethylhexyl)phthalate	B		J		
Turning-basin	DTB-04SD	DTB-04SD	Bis(2-ethylhexyl)phthalate	B		J	U	BU
Turning-basin	DTB-01SD	DTB-01SD	Bis(2-ethylhexyl)phthalate	B		J		
Turning-basin	DTB-03SD	DTB-03SD	Bis(2-ethylhexyl)phthalate	B		J		
Turning-basin	DTB-04SD	DTB-04SD	Butyl benzyl phthalate	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Chrysene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Dibenzo(a,h)anthracene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Dibenzofuran	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Diethyl phthalate	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Dimethyl phthalate	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Di-n-butyl phthalate	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Di-n-octyl phthalate	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Fluoranthene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Fluorene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Hexachlorobenzene	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Hexachlorobutadiene	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Hexachloroethane	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Indeno(1,2,3-cd)pyrene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Naphthalene	J-		J	JL	J

Table B-1. Sample-specific data qualifier changes

Sampling Event	Location	Sample ID	Analyte	Laboratory Qualifier	Validation Qualifier-original	Interpreted Qualifier-original	Validation Qualifier-revised	Interpreted Qualifier-revised
Turning-basin	DTB-04SD	DTB-04SD	N-Nitrosodiphenylamine	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Pentachlorophenol	UJ-		UJ	UJL	UJ
Turning-basin	DTB-04SD	DTB-04SD	Phenanthrene	J-		J	JL	J
Turning-basin	DTB-04SD	DTB-04SD	Phenol	B		UJ	U	BU
Turning-basin	DTB-03SD	DTB-03SD	Phenol	B		UJ	U	BU
Turning-basin	DTB-01SD	DTB-01SD	Phenol	B		UJ	U	BU
Turning-basin	DTB-05SD	DTB-05SD	Phenol	B		UJ	U	BU
Turning-basin	DTB-02SD	DTB-02SD	Phenol	B		UJ	U	BU
Turning-basin	DTB-04SD	DTB-04SD	Pyrene	J-		J	JL	J
Turning-basin	DTB-02SD	DTB-02SD	Sulfide				JH	J
Turning-basin	DTB-04SD	DTB-04SD	Sulfide				JH	J
Turning-basin	DTB-03SD	DTB-03SD	Sulfide				JH	J
Turning-basin	DTB-01SD	DTB-01SD	Sulfide	J+		J	JH	J
Turning-basin	DTB-05SD	DTB-05SD	Sulfide				JH	J