APPENDIX J

QA1 Data Validation Memos

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: December 8, 2008	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11422

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
SH-01-SS-00	9/29/08 ; 18:05	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
SH-02-SS-00	9/30/08 ; 10:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
SH-10-SS-00	9/30/08 ; 13:40	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-14-SS-00	9/30/08 ; 15:05	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-22-WS-00	9/30/08 ; 16:48	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-23-WS-00	9/30/08 ; 15:43	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-26-WS-00	9/30/08 ; 12:50	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-27-WS-00	9/30/08 ; 11:55	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-28-WS-00	9/30/08 ; 14:29	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-10-SC-12	9/30/08 ; 14:50	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-14-SC-12	9/30/08 ; 17:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-23-WC-12	9/30/08 ; 18:20	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-28-WC-12	9/30/08 ; 19:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls

Analytical methods

Analysis	Analytical Method	Number of Samples
Metals	EPA method 6020	13
Mercury	EPA method 7471A	13
Pesticides	EPA method 8081A	13
Polychlorinated biphenyls (PCBs)	EPA method 8082	13
Petroleum hydrocarbons	Ecology's NWTPH-HCID	2

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General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes.
Case narrative present and complete?	Yes
Any holding time violations?	No

Pesticides and PCBs Checklist

Any compounds present in method blanks?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, refer to table below. Sample results were qualified as estimated biased low (JG, JTG, or UJG) based on surrogate recoveries.
MS/MSD percent recovery values within laboratory QC criteria?	No, refer to table below. The sample results were qualified as estimated.
MS/MSD relative percent difference values within QC criteria of <35%?	Yes, refer to table below. RPD for 4,4-DDT was 45 percent. No data qualified.
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	No, refer to table below. Beta-BHC recovery was high. All detected values for beta-BHC were qualified as estimated (J).
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	Yes, methoxychlor exceeded the linear range for sample SH-22-WS-00. Only the dilution was reported
Spot check retention time windows and second column confirmations as complete.	Sample results that exceeded a relative percent difference of 40% between columns were qualified as estimated bias low (JG or JTG).

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Petroleum Hydrocarbons Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	Yes
Laboratory QC frequency of one blank with each batch and one duplicate per 20 samples?	Yes
Duplicate relative percent difference values less than 35 percent?	Yes

Metals Checklist

Any compounds present in method blank?	Yes, see table below.
For samples, if results are <5 times the blank then "U" flag data.	All results for copper, nickel, and zinc were greater than 5 times the blank result. No data were qualified.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes
Were elements recovered $\leq$30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within QC criteria of 80-120%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is there one serial dilution per 20 samples? Are percent difference values within laboratory QC criteria?	Yes
Spot check ICS recoveries 80-120%.	All are acceptable.
Spot check Correlation Coefficient > 0.995.	All are acceptable.
Spot check ICV 90-110%. Contact lab.	All are acceptable.
Spot check CCV 90-110% or 80-120% for Hg. Contact lab.	All are acceptable.

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Copper, nickel, and zinc were detected in the method blank. No samples were qualified because all sample results for copper, nickel, and zinc were greater than 5 times the method blank results.

- Surrogate recoveries for pesticide and PCB analyses were below the lower laboratory control limits as shown in the table below. Data were qualified as estimated bias low (JG, JTG, or UJG) if the surrogate recovery values were below the EPA CLP limits of 30 to 150 percent.

- The relative percent difference (RPD) value in the MS/MSD analysis for 4,4'-DDT (45 percent) was outside of the control limit of less than 35 percent. No data were qualified because the RPD value met the QA1 Action Limit of 50 percent.

- Percent recovery values for methoxychlor (36 percent) in the MSD, and Aroclor 1016 (32 and 24 percent) and Aroclor 1260 (35 and 26 percent) in both the MS and MSD analyses of sample SH-28-WC-12 exceeded the laboratory control limits (46 to 154 percent for methoxychlor, 40 to 140 percent for Aroclor 1016, and 60 to 130 percent for Aroclor 1260). No results for methoxychlor were qualified because the percent recovery for the MS was within control limits. The PCB results for sample SH-28-WC-12 were qualified as estimated bias low (UJG) due to matrix spike recovery exceedance.

- The percent recovery for beta-BHC (127 percent) in the laboratory control sample exceeded the control limits of 48 to 121 percent. Only samples with a detected result for beta-BHC (SH-14-SS-00, SH-14-SC-12, and SH-23-WC-12) were qualified as estimated.

- Several chlorinated pesticides compounds were identified with a RPD value between the primary and secondary columns greater than the 40 percent method limit. The lower of the two values were reported by the laboratory for all samples. As shown in the table below, compounds with a RPD between columns of greater than 40 percent were qualified as estimated bias low.

Positive Blanks

Method	Sample ID	Blank Type	Compound	Result	Flag	Units	RL
6020	MB-580-36868	Method	Copper	0.025	J	mg/kg	0.20
6020	MB-580-36868	Method	Nickel	0.0064	J	mg/kg	0.20
6020	MB-580-36868	Method	Zinc	0.63	J	mg/kg	0.70

Samples Qualified for Positive Method Blank Results

No samples qualified for positive method blank results

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Samples Qualified for Surrogate Recoveries Outside Control Limits

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8081A	SH-01-SS-00	Tetrachloro-m-xylene	36	49-123	30-150	None
8081A	SH-01-SS-00	Decachlorobiphenyl	16	40-158	30-150	JTG or UJG
8081A	SH-02-SS-00	Decachlorobiphenyl	30	40-158	30-150	None
8081A	SH-10-SS-00	Tetrachloro-m-xylene	44	49-123	30-150	None
8081A	SH-10-SS-00	Decachlorobiphenyl	21	40-158	30-150	JTG or UJG
8081A	SH-14-SS-00	Tetrachloro-m-xylene	25	49-123	30-150	JG, JTG, or UJG
8081A	SH-14-SS-00	Decachlorobiphenyl	11	40-158	30-150	JG, JTG, or UJG
8081A	SH-22-WS-00	Tetrachloro-m-xylene	44	49-123	30-150	None
8081A	SH-23-WS-00	Tetrachloro-m-xylene	43	49-123	30-150	None
8081A	SH-27-WS-00	Decachlorobiphenyl	35	40-158	30-150	None
8081A	SH-28-WS-00	Decachlorobiphenyl	33	40-158	30-150	None
8081A	SH-10-SC-12	Decachlorobiphenyl	36	40-158	30-150	None
8082	SH-01-SS-00	Tetrachloro-m-xylene	24	45-155	30-150	JG of UJG
8082	SH-01-SS-00	Decachlorobiphenyl	21	60-125	30-150	JG of UJG
8082	SH-02-SS-00	Tetrachloro-m-xylene	30	45-155	30-150	None
8082	SH-02-SS-00	Decachlorobiphenyl	26	60-125	30-150	UJG
8082	SH-10-SS-00	Tetrachloro-m-xylene	25	45-155	30-150	UJG
8082	SH-10-SS-00	Decachlorobiphenyl	20	60-125	30-150	UJG
8082	SH-14-SS-00	Tetrachloro-m-xylene	32	45-155	30-150	None
8082	SH-14-SS-00	Decachlorobiphenyl	31	60-125	30-150	None
8082	SH-22-WS-00	Tetrachloro-m-xylene	20	45-155	30-150	UJG
8082	SH-22-WS-00	Decachlorobiphenyl	25	60-125	30-150	UJG
8082	SH-23-WS-00	Tetrachloro-m-xylene	30	45-155	30-150	None
8082	SH-23-WS-00	Decachlorobiphenyl	29	60-125	30-150	UJG
8082	SH-27-WS-00	Tetrachloro-m-xylene	42	45-155	30-150	None
8082	SH-27-WS-00	Decachlorobiphenyl	34	60-125	30-150	None
8082	SH-28-WS-00	Tetrachloro-m-xylene	22	45-155	30-150	UJG
8082	SH-28-WS-00	Decachlorobiphenyl	22	60-125	30-150	UJG
8082	SH-10-SC-12	Decachlorobiphenyl	52	60-125	30-150	None
8082	SH-10-SC-12	Decachlorobiphenyl	34	60-125	30-150	None
8082	SH-23-WC-12	Tetrachloro-m-xylene	23	45-155	30-150	UJG
8082	SH-23-WC-12	Decachlorobiphenyl	22	60-125	30-150	UJG
8082	SH-28-WC-12	Tetrachloro-m-xylene	25	45-155	30-150	UJG
8082	SH-28-WC-12	Decachlorobiphenyl	21	60-125	30-150	UJG

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Duplicate or Triplicate Results Outside Control Limits

Method	Sample ID	Type	Compound	% RPD	Limits	Qualifier
8081A	SH-28-WC-12	MS/MSD	4,4'-DDT	45	0-35	None

Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Type	Compound	% Rec	Limits	Qualifier
8081A	SH-28-WC-12	MSD	Methoxychlor	36	46-154	None
8082	SH-28-WC-12	MS	Aroclor 1016	32	40-140	UJG
8082	SH-28-WC-12	MSD	Aroclor 1260	35	60-130	UJG
8082	SH-28-WC-12	MS	Aroclor 1016	24	40-140	UJG
8082	SH-28-WC-12	MSD	Aroclor 1260	26	60-130	UJG

Samples Qualified for Laboratory Control Sample Recoveries Outside Control Limits

Method	Sample ID	Compound	LCS % REC	Lab Limits	Qualifier
8081A	SH-14-SS-00	beta-BHC	127	48-121	J
8081A	SH-14-SC-12	beta-BHC	127	48-121	J
8081A	SH-23-WC-12	beta-BHC	127	48-121	J

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

Sample ID	Compound	Reason for reanalysis
SH-22-WS-00	Methoxychlor	Result exceeded linear range. Analyzed at a 10x dilution.

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Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

Method	Sample ID	Compound	Limits	Qualifier
8081A	SH-01-SS-00	alpha-BHC	< 40 percent	JTG
8081A	SH-02-SS-00	alpha-BHC	< 40 percent	JTG
8081A	SH-02-SS-00	gamma-BHC	< 40 percent	JTG
8081A	SH-02-SS-00	Methoxychlor	< 40 percent	JTG
8081A	SH-10-SS-00	alpha-BHC	< 40 percent	JTG
8081A	SH-10-SS-00	Heptachlor	< 40 percent	JTG
8081A	SH-14-SS-00	4,4'-DDD	< 40 percent	JG
8081A	SH-14-SS-00	Endosulfan I	< 40 percent	JG
8081A	SH-22-WS-00	Aldrin	< 40 percent	JTG
8081A	SH-22-WS-00	Endosulfan I	< 40 percent	JG
8081A	SH-23-WS-00	alpha-BHC	< 40 percent	JTG
8081A	SH-23-WS-00	Dieldrin	< 40 percent	JTG
8081A	SH-27-WS-00	delta-BHC	< 40 percent	JTG
8081A	SH-27-WS-00	Heptachlor	< 40 percent	JTG
8081A	SH-28-WS-00	alpha-BHC	< 40 percent	JTG
8081A	SH-28-WS-00	delta-BHC	< 40 percent	JTG
8081A	SH-10-SC-12	4,4'-DDD	< 40 percent	JTG
8081A	SH-14-SC-12	Aldrin	< 40 percent	JTG
8081A	SH-14-SC-12	alpha-BHC	< 40 percent	JTG
8081A	SH-14-SC-12	4,4'-DDD	< 40 percent	JTG
8081A	SH-14-SC-12	4,4'-DDT	< 40 percent	JG
8081A	SH-14-SC-12	Endosulfan I	< 40 percent	JTG
8081A	SH-14-SC-12	Endosulfan II	< 40 percent	JTG
8081A	SH-14-SC-12	Heptachlor epoxide	< 40 percent	JTG
8081A	SH-14-SC-12	Methoxychlor	< 40 percent	JTG
8081A	SH-14-SC-12	Endrin ketone	< 40 percent	JG
8081A	SH-23-WC-12	Endosulfan I	< 40 percent	JTG
8081A	SH-28-WC-12	alpha-BHC	< 40 percent	JTG
8081A	SH-28-WC-12	Endosulfan II	< 40 percent	JTG
8081A	SH-28-WC-12	gamma-Chlordane	< 40 percent	JTG

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Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
JG	Analyte was positively identified. Value may be greater than the reported estimate.
JTG	Analyte was positively identified. Value may be greater than the reported result, which is an estimate below the associated quantitation limit but above the MDL.
UJG	Analyte was not detected at or above the reported estimate with likely low bias.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 14, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11469

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 14, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11469

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
SH-05-SS-00	10/01/08 ; 09:11	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
SH-04-SS-00	10/01/08 ; 09:50	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-09-SS-00	10/01/08 ; 11:21	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-21-WS-00	10/01/08 ; 11:45	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-20-WS-00	10/01/08 ; 12:28	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-19-WS-00	10/01/08 ; 12:52	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-24-WS-00	10/01/08 ; 13:32	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-15-SS-00	10/01/08 ; 15:44	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-29-WS-00	10/01/08 ; 16:19	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-16-SS-00	10/01/08 ; 16:54	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-30-WS-00	10/01/08 ; 17:15	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-03-SS-00	10/01/08 ; 10:20	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-15-SC-12	10/01/08 ; 16:20	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-01-SC-12	10/01/08 ; 12:35	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
SH-09-SC-12	10/01/08 ; 18:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
HI-07-SS-00	10/02/08 ; 08:48	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-12-SS-00	10/02/08 ; 09:40	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-11-SS-00	10/02/08 ; 10:32	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-18-WS-00	10/02/08 ; 11:15	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
SH-25-WS-00	10/02/08 ; 12:05	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
HI-05-SS-00	10/02/08 ; 13:24	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-02-SS-00	10/02/08 ; 14:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-01-SS-00	10/02/08 ; 15:23	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
OB-03-SS-00	10/02/08 ; 16:10	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-21-WC-12	10/02/08 ; 09:50	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-16-SC-12	10/02/08 ; 12:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-30-WC-12	10/02/08 ; 13:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-12-SC-12	10/02/08 ; 15:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-18-WC-12	10/02/08 ; 16:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls

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Analytical methods

Analysis	Analytical Method	Number of Samples
Metals	EPA method 6020	29
Mercury	EPA method 7471A	29
Pesticides	EPA method 8081A	29
Polychlorinated biphenyls (PCBs)	EPA method 8082	29
Petroleum hydrocarbons	Ecology's NWTPH-HCID	4

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes.
Case narrative present and complete?	Yes
Any holding time violations?	Yes. Twenty-one samples prepared outside of holding time for PCBs analysis because samples required extensive clean-up due to interferences. Originally prepared within holding time, but needed to be re-extracted due to matrix interferences.

Pesticides and PCBs Checklist

Any compounds present in method blanks?	Yes
For samples, if results are <5 times the blank then "U" flag data.	See table below.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	No, see table below.
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
MS/MSD percent recovery values within laboratory QC criteria?	No, see table below
MS/MSD relative percent difference values within QC criteria of <35%?	No, see table below.
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	No, see table below.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes

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Pesticides and PCBs Checklist

Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	No
Spot check retention time windows and second column confirmations as complete.	See table below. Sample results that exceeded a relative percent difference of 40% between columns were qualified as estimated bias low (JG,UJG, or JTG).

Petroleum Hydrocarbons Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
Laboratory QC frequency of one blank with each batch and one duplicate per 20 samples?	Yes
Duplicate relative percent difference values less than 35 percent?	Yes

Metals Checklist

Any compounds present in method blank?	Yes, see table below.
For samples, if results are <5 times the blank then "U" flag data.	None less than 5 times blank result.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes
Were elements recovered $\underline{<}$30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	No, mercury result for duplicate analysis of sample SH-21-WS-00 was 43%.
LCS percent recovery values within QC criteria of 80-120%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is there one serial dilution per 20 samples? Are percent difference values within laboratory QC criteria?	Yes
Spot check ICS recoveries 80-120%.	All are acceptable.
Spot check Correlation Coefficient > 0.995.	All are acceptable.
Spot check ICV 90-110%. Contact lab.	All are acceptable.
Spot check CCV 90-110% or 80-120% for Hg. Contact lab.	All are acceptable.

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Twenty-one samples were extracted outside of holding time (1, 2, or 5 days) for PCB analysis. These 21 samples were originally extracted within holding time (14 days from collection), but after initial analysis it was determined that the samples needed extensive cleanup due to matrix interferences. PCBs were not detected in any of the 21 samples, so all results were qualified as estimated at the detection limit (UJ), as shown in the table below.

- Endrin and heptachlor epoxide were detected in the method blank for sample batch 36847. Samples with detected concentrations of endrin or heptachlor epoxide that were less than 5 times the method blank concentration were qualified as undetected (U), as shown in the table below.

- Several metals were detected in each of the three method blanks, as shown in the table below. No samples were qualified because all sample results for all analytes were greater than 5 times the method blank results.

- Surrogate recoveries for pesticides and PCB analyses of several samples were below the lower laboratory control limits as shown in the table below. Data were qualified because of surrogate recovery value criteria if the recovery value did not meet the EPA CLP limits of 30 to 150 percent, as shown in the table below.

- RPD values for all pesticide compounds for the MS/MSD analysis of sample SH-21-WS-00 exceeded the less than 35 percent criterion. Results for sample SH-21-WS-00 were qualified as estimated (UJG of JG), as shown in the table below.

- The RPD value for Aroclor 1016 for the MS/MSD analysis of sample SH-04-SS-00 exceeded the less than 35 percent criterion. Results for sample SH-04-SS-00 were qualified as estimated (UJG), as shown in the table below.

- The RPD value for mercury for the laboratory duplicate analysis of sample SH-21-WS-00 exceeded the less than 20 percent criterion. The mercury result for sample SH-21-WS-00 was qualified as estimated (J), as shown in the table below.

- The percent recovery values for all pesticide and PCB compounds for the MS/MSD analysis of sample SH-21-WS-00 exceeded the laboratory control limits. Results for sample SH-21-WS-00 were qualified as estimated (UJG or JG), as shown in the table below.

- The percent recovery values for alpha-chlordane, gamma-chlordane, and aldrin for the LCS analyses exceeded the upper control limits. All associated samples with reported results of alpha-chlordane, gamma-chlordane, and aldrin above the detection limit were qualified as estimated (J), as shown in the table below.

- Several chlorinated pesticides compounds were identified with a RPD value between the primary and secondary columns greater than the 40 percent method limit. As shown in the table below, compounds with a RPD between columns of greater than 40 percent were qualified as estimated.

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Samples Analyzed Outside of Holding Time

Method	Sample ID	Analyses	Holding Time	Day Outside of Holding Time	Qualifier
8082	SH-04-SS-00	PCBs	14 days	2	UJG
8082	SH-09-SS-00	PCBs	14 days	2	UJ
8082	SH-20-WS-00	PCBs	14 days	2	UJ
8082	SH-19-WS-00	PCBs	14 days	2	UJ
8082	SH-24-WS-00	PCBs	14 days	2	UJ
8082	SH-30-WS-00	PCBs	14 days	2	UJ
8082	SH-03-SS-00	PCBs	14 days	2	UJ
8082	SH-15-SC-12	PCBs	14 days	2	UJ
8082	SH-01-SC-12	PCBs	14 days	2	UJ
8082	SH-09-SC-12	PCBs	14 days	2	UJ
8082	SH-12-SS-00	PCBs	14 days	1	UJ
8082	SH-18-WS-00	PCBs	14 days	1	UJ
8082	SH-25-WS-00	PCBs	14 days	1	UJ
8082	OB-02-SS-00	PCBs	14 days	1	UJ
8082	OB-01-SS-00	PCBs	14 days	1	UJ
8082	OB-03-SS-00	PCBs	14 days	1	UJ
8082	SH-21-WC-12	PCBs	14 days	1	UJ
8082	SH-16-SC-12	PCBs	14 days	1	UJ
8082	SH-30-WC-12	PCBs	14 days	1	UJ
8082	SH-12-SC-12	PCBs	14 days	5	UJ
8082	SH-18-WC-12	PCBs	14 days	5	UJ

Positive Blanks

Method	Sample ID	Blank Type	Compound	Result	Flag	Units	RL
8081A	MB-580-36847	Method	Endrin	0.21	J	ug/L	2.0
8081A	MB-580-36847	Method	Heptachlor epoxide	0.016	J	ug/L	1.0
6020	MB-580-36868	Method	Copper	0.025	J	mg/kg	0.20
6020	MB-580-36868	Method	Nickel	0.0064	J	mg/kg	0.20
6020	MB-580-36868	Method	Zinc	0.63	J	mg/kg	0.70
6020	MB-580-36872	Method	Cadmium	0.0023	J	mg/kg	0.20
6020	MB-580-36872	Method	Chromium	0.0097	J	mg/kg	0.20
6020	MB-580-36872	Method	Lead	0.0023	J	mg/kg	0.20
6020	MB-580-36872	Method	Silver	0.0011	J	mg/kg	0.20
6020	MB-580-36872	Method	Zinc	0.033	J	mg/kg	0.70
6020	MB-580-36873	Method	Cadmium	0.0026	J	mg/kg	0.20
6020	MB-580-36873	Method	Chromium	0.017	J	mg/kg	0.20
6020	MB-580-36873	Method	Copper	0.0044	J	mg/kg	0.20
6020	MB-580-36873	Method	Lead	0.0057	J	mg/kg	0.20
6020	MB-580-36873	Method	Nickel	0.019	J	mg/kg	0.20
6020	MB-580-36873	Method	Silver	0.0038	J	mg/kg	0.20
6020	MB-580-36873	Method	Zinc	0.030	J	mg/kg	0.70

Samples Qualified for Positive Method Blank Results

Method	Sample ID	Compound	Result	Units	Qualifier
8081A	SH-11-SS-00	Endrin	0.44	ug/kg	U
8081A	SH-09-SC-12	Endrin	0.91	ug/kg	U
8081A	SH-01-SC-12	Endrin	0.44	ug/kg	U
8081A	SH-03-SS-00	Heptachlor epoxide	0.042	ug/kg	U
8081A	SH-20-WS-00	Heptachlor epoxide	0.054	ug/kg	U
8081A	SH-16-SS-00	Heptachlor epoxide	0.069	ug/kg	U
8081A	SH-16-SS-00	Endrin	0.22	ug/kg	U

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Samples with Surrogate Recoveries Outside Laboratory Control Limits

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8081A	Method Blank	Tetrachloro-m-xylene	128	49-123	30-150	None
8081A	SH-05-SS-00	Decachlorobiphenyl	39	40-158	30-150	None
8081A	SH-04-SS-00	Decachlorobiphenyl	30	40-158	30-150	None
8081A	SH-21-WS-00	Tetrachloro-m-xylene	45	49-123	30-150	None
8081A	SH-21-WS-00	Decachlorobiphenyl	31	40-158	30-150	None
8081A	SH-20-WS-00	Tetrachloro-m-xylene	45	49-123	30-150	None
8081A	SH-20-WS-00	Decachlorobiphenyl	35	40-158	30-150	None
8081A	SH-19-WS-00	Tetrachloro-m-xylene	41	49-123	30-150	None
8081A	SH-19-WS-00	Decachlorobiphenyl	23	40-158	30-150	UJG or JTG
8081A	SH-24-WS-00	Decachlorobiphenyl	32	40-158	30-150	None
8081A	SH-16-SS-00	Decachlorobiphenyl	26	40-158	30-150	UJG or JTG
8081A	SH-15-SC-12	Decachlorobiphenyl	20	40-158	30-150	UJG
8081A	SH-01-SC-12	Decachlorobiphenyl	31	40-158	30-150	None
8081A	SH-09-SC-12	Decachlorobiphenyl	38	40-158	30-150	None
8081A	HI-07-SS-00	Decachlorobiphenyl	38	40-158	30-150	None
8081A	SH-18-WS-00	Tetrachloro-m-xylene	44	49-123	30-150	None
8081A	SH-18-WS-00	Decachlorobiphenyl	39	40-158	30-150	None
8081A	SH-25-WS-00	Tetrachloro-m-xylene	36	49-123	30-150	None
8081A	SH-25-WS-00	Decachlorobiphenyl	27	40-158	30-150	UJG or JTG
8081A	HI-05-SS-00	Decachlorobiphenyl	30	40-158	30-150	None
8081A	OB-01-SS-00	Decachlorobiphenyl	32	40-158	30-150	None
8081A	SH-18-WC-12	Tetrachloro-m-xylene	46	49-123	30-150	None
8081A	SH-18-WC-12	Decachlorobiphenyl	36	40-158	30-150	None
8082	SH-05-SS-00	Decachlorobiphenyl	54	60-125	30-150	None
8082	SH-04-SS-00	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	SH-04-SS-00	Decachlorobiphenyl	44	60-125	30-150	None
8082	SH-09-SS-00	Decachlorobiphenyl	55	60-125	30-150	None
8082	SH-21-WS-00	Tetrachloro-m-xylene	16	45-155	30-150	UJG
8082	SH-21-WS-00	Decachlorobiphenyl	14	60-125	30-150	UJG
8082	SH-20-WS-00	Tetrachloro-m-xylene	26	45-155	30-150	UJG
8082	SH-20-WS-00	Decachlorobiphenyl	27	60-125	30-150	UJG
8082	SH-19-WS-00	Tetrachloro-m-xylene	23	45-155	30-150	UJG
8082	SH-19-WS-00	Decachlorobiphenyl	23	60-125	30-150	UJG
8082	SH-24-WS-00	Tetrachloro-m-xylene	26	45-155	30-150	UJG
8082	SH-24-WS-00	Decachlorobiphenyl	21	60-125	30-150	UJG
8082	SH-15-SS-00	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	SH-15-SS-00	Decachlorobiphenyl	56	60-125	30-150	None
8082	SH-29-WS-00	Tetrachloro-m-xylene	37	45-155	30-150	None

Samples with Surrogate Recoveries Outside Laboratory Control Limits (continued)

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8082	SH-29-WS-00	Decachlorobiphenyl	42	60-125	30-150	None
8082	SH-16-SS-00	Tetrachloro-m-xylene	34	45-155	30-150	None
8082	SH-16-SS-00	Decachlorobiphenyl	29	60-125	30-150	UJG
8082	SH-30-WS-00	Tetrachloro-m-xylene	36	45-155	30-150	None
8082	SH-30-WS-00	Decachlorobiphenyl	32	60-125	30-150	None
8082	SH-03-SS-00	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	SH-03-SS-00	Decachlorobiphenyl	38	60-125	30-150	None
8082	SH-15-SC-12	Decachlorobiphenyl	57	60-125	30-150	None
8082	SH-01-SC-12	Decachlorobiphenyl	45	60-125	30-150	None
8082	SH-09-SC-12	Decachlorobiphenyl	57	60-125	30-150	None
8082	HI-07-SS-00	Decachlorobiphenyl	45	60-125	30-150	None
8082	SH-12-SS-00	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	SH-12-SS-00	Decachlorobiphenyl	42	60-125	30-150	None
8082	SH-11-SS-00	Tetrachloro-m-xylene	42	45-155	30-150	None
8082	SH-11-SS-00	Decachlorobiphenyl	49	60-125	30-150	None
8082	SH-18-WS-00	Tetrachloro-m-xylene	36	45-155	30-150	None
8082	SH-18-WS-00	Decachlorobiphenyl	37	60-125	30-150	None
8082	SH-25-WS-00	Tetrachloro-m-xylene	32	45-155	30-150	None
8082	SH-25-WS-00	Decachlorobiphenyl	30	60-125	30-150	None
8082	HI-05-SS-00	Decachlorobiphenyl	33	60-125	30-150	None
8082	OB-02-SS-00	Tetrachloro-m-xylene	40	45-155	30-150	None
8082	OB-02-SS-00	Decachlorobiphenyl	34	60-125	30-150	None
8082	OB-01-SS-00	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	OB-01-SS-00	Decachlorobiphenyl	38	60-125	30-150	None
8082	OB-03-SS-00	Tetrachloro-m-xylene	38	45-155	30-150	None
8082	OB-03-SS-00	Decachlorobiphenyl	43	60-125	30-150	None
8082	SH-21-WC-12	Tetrachloro-m-xylene	37	45-155	30-150	None
8082	SH-21-WC-12	Decachlorobiphenyl	38	60-125	30-150	None
8082	SH-16-SC-12	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	SH-16-SC-12	Decachlorobiphenyl	42	60-125	30-150	None
8082	SH-30-WC-12	Decachlorobiphenyl	39	60-125	30-150	None
8082	SH-12-SC-12	Tetrachloro-m-xylene	38	45-155	30-150	None
8082	SH-12-SC-12	Decachlorobiphenyl	24	60-125	30-150	UJG
8082	SH-18-WC-12	Tetrachloro-m-xylene	39	45-155	30-150	None
8082	SH-18-WC-12	Decachlorobiphenyl	29	60-125	30-150	UJG
8082	MB 580-37093	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	MB 580-37093	Decachlorobiphenyl	49	60-125	30-150	None
8082	LCS 580-36850	Decachlorobiphenyl	132	60-125	30-150	None
HCID	OB-01-SS-00	o-Terphenyl	47	50-150	NA	UJG

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Duplicate or Triplicate Results Outside Control Limits

Method	Sample ID	Compound	RPD	QC Limits	Qualifier
8081A	SH-21-WS-00	alpha-BHC	43	0-35	UJG
8081A	SH-21-WS-00	delta-BHC	52	0-35	UJG
8081A	SH-21-WS-00	gamma-BHC	49	0-35	UJG
8081A	SH-21-WS-00	4,4'-DDE	40	0-35	UJG
8081A	SH-21-WS-00	4,4'-DDT	57	0-35	UJG
8081A	SH-21-WS-00	Dieldrin	37	0-35	UJG
8081A	SH-21-WS-00	Endosulfan II	55	0-35	UJG
8081A	SH-21-WS-00	Endosulfan sulfate	53	0-35	UJG
8081A	SH-21-WS-00	Endrin	55	0-35	UJG
8081A	SH-21-WS-00	Heptachlor	37	0-35	UJG
8081A	SH-21-WS-00	Heptachlor epoxide	48	0-35	UJG
8081A	SH-21-WS-00	Methyoxychlor	51	0-35	JG
8081A	SH-21-WS-00	Endrin ketone	58	0-35	UJG
8081A	SH-21-WS-00	alpha-Chlordane	37	0-35	UJG
8081A	SH-21-WS-00	gamma-Chlordane	46	0-35	UJG
8082	SH-04-SS-00	Aroclor 1016	37	0-35	UJG
7471A	SH-21-WS-00	Mercury	43	0-20	J

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Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Compound	MS % Rec	MSD %Rec	Limits	Qualifier
8081A	SH-21-WS-00	Aldrin	26	35	53-126	UJG
8081A	SH-21-WS-00	alpha-BHC	23	38	41-128	UJG
8081A	SH-21-WS-00	beta-BHC	37	53	48-121	UJG
8081A	SH-21-WS-00	delta-BHC	18	31	22-153	UJG
8081A	SH-21-WS-00	gamma-BHC	26	42	50-127	UJG
8081A	SH-21-WS-00	4,4'-DDD	18	27	44-141	UJG
8081A	SH-21-WS-00	4,4'-DDE	20	30	47-140	UJG
8081A	SH-21-WS-00	4,4'-DDT	15	27	34-159	UJG
8081A	SH-21-WS-00	Dieldrin	23	36	53-134	UJG
8081A	SH-21-WS-00	Endosulfan I	23	30	52-122	UJG
8081A	SH-21-WS-00	Endosulfan II	17	30	53-132	UJG
8081A	SH-21-WS-00	Endosulfan sulfate	17	30	42-128	UJG
8081A	SH-21-WS-00	Endrin	18	31	46-138	UJG
8081A	SH-21-WS-00	Endrin aldehyde	23	32	12-179	UJG
8081A	SH-21-WS-00	Heptachlor	20	32	50-130	UJG
8081A	SH-21-WS-00	Heptachlor epoxide	19	31	49-123	UJG
8081A	SH-21-WS-00	Methyoxychlor	11	24	46-154	JG
8081A	SH-21-WS-00	Endrin ketone	17	31	45-127	UJG
8081A	SH-21-WS-00	alpha-Chlordane	20	30	46-118	UJG
8081A	SH-21-WS-00	gamma-Chlordane	20	33	49-122	UJG
8082	SH-21-WS-00	Aroclor 1016	23	22	40-140	UJG
8082	SH-21-WS-00	Aroclor 1260	17	22	60-130	UJG
8082	SH-21-WS-00	Aroclor 1260	56	46	60-130	UJG

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Samples Qualified for Laboratory Control Sample Recoveries Outside Control Limits

Method	Sample ID	Compound	LCS % REC	Lab Limits	Qualifier
8081A	SH-21-WC-12	alpha-Chlordane	128	53-126	J
8081A	SH-21-WC-12	gamma-Chlordane	131	49-122	J
8081A	SH-16-SC-12	gamma-Chlordane	131	49-122	J
8081A	SH-30-WC-12	Aldrin	128	53-126	J
8081A	SH-30-WC-12	alpha-Chlordane	124	46-118	J
8081A	SH-30-WC-12	gamma-Chlordane	131	49-122	J
8081A	SH-12-SC-12	alpha-Chlordane	124	46-118	J
8081A	SH-12-SC-12	gamma-Chlordane	131	49-122	J
8081A	SH-18-WC-12	Aldrin	128	53-126	J
8081A	SH-18-WC-12	alpha-Chlordane	124	46-118	J
8081A	SH-18-WC-12	gamma-Chlordane	127	48-121	J

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

No compounds reported form reanalysis or dilution.

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Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

Method	Sample ID	Compound	Limits	Qualifier
8081A	SH-05-SS-00	Aldrin	< 40 percent	J
8081A	SH-05-SS-00	alpha-BHC	< 40 percent	J
8081A	SH-05-SS-00	beta-BHC	< 40 percent	J
8081A	SH-05-SS-00	delta-BHC	< 40 percent	J
8081A	SH-05-SS-00	Endosulfan sulfate	< 40 percent	J
8081A	SH-04-SS-00	Aldrin	< 40 percent	J
8081A	SH-04-SS-00	alpha-BHC	< 40 percent	J
8081A	SH-04-SS-00	beta-BHC	< 40 percent	J
8081A	SH-04-SS-00	gamma-BHC	< 40 percent	J
8081A	SH-04-SS-00	4,4'-DDD	< 40 percent	J
8081A	SH-04-SS-00	Dieldrin	< 40 percent	J
8081A	SH-04-SS-00	Heptachlor epoxide	< 40 percent	J
8081A	SH-09-SS-00	alpha-BHC	< 40 percent	J
8081A	SH-09-SS-00	gamma-BHC	< 40 percent	J
8081A	SH-09-SS-00	4,4'-DDD	< 40 percent	J
8081A	SH-09-SS-00	4,4'-DDE	< 40 percent	J
8081A	SH-09-SS-00	Dieldrin	< 40 percent	J
8081A	SH-19-WS-00	gamma-BHC	< 40 percent	JTG
8081A	SH-19-WS-00	Dieldrin	< 40 percent	JTG
8081A	SH-19-WS-00	Heptachlor epoxide	< 40 percent	JTG
8081A	SH-24-WS-00	Endrin	< 40 percent	J
8081A	SH-30-WS-00	gamma-BHC	< 40 percent	J
8081A	SH-30-WS-00	Endosulfan I	< 40 percent	J
8081A	SH-30-WS-00	Heptachlor epoxide	< 40 percent	J
8081A	SH-03-SS-00	4,4'-DDE	< 40 percent	J
8081A	SH-03-SS-00	Heptachlor epoxide	< 40 percent	U
8081A	SH-01-SC-12	delta-BHC	< 40 percent	J
8081A	SH-01-SC-12	gamma-BHC	< 40 percent	J
8081A	SH-01-SC-12	4,4'-DDE	< 40 percent	J
8081A	SH-09-SC-12	delta-BHC	< 40 percent	J
8081A	SH-09-SC-12	4,4'-DDD	< 40 percent	J
8081A	SH-09-SC-12	4,4'-DDE	< 40 percent	J
8081A	SH-09-SC-12	4,4'-DDT	< 40 percent	J
8081A	SH-09-SC-12	Endosulfan II	< 40 percent	J
8081A	SH-09-SC-12	Endosulfan sulfate	< 40 percent	J
8081A	HI-07-SS-00	gamma-BHC	< 40 percent	J
8081A	HI-07-SS-00	4,4'-DDD	< 40 percent	J

8081A	HI-07-SS-00	4,4'-DDE	< 40 percent	J
8081A	HI-07-SS-00	gamma-Chlordane	< 40 percent	J
8081A	SH-12-SS-00	4,4'-DDD	< 40 percent	J
8081A	SH-12-SS-00	4,4'-DDE	< 40 percent	J
8081A	SH-12-SS-00	4,4'-DDT	< 40 percent	J
8081A	SH-12-SS-00	Endosulfan I	< 40 percent	J
8081A	SH-12-SS-00	Endrin	< 40 percent	J
8081A	SH-12-SS-00	gamma-Chlordane	< 40 percent	J
8081A	SH-11-SS-00	4,4'-DDE	< 40 percent	J
8081A	SH-11-SS-00	4,4'-DDT	< 40 percent	J
8081A	SH-11-SS-00	Endrin	< 40 percent	U
8081A	SH-11-SS-00	Endrin aldehyde	< 40 percent	J
8081A	SH-18-WS-00	delta-BHC	< 40 percent	J
8081A	SH-18-WS-00	4,4'-DDT	< 40 percent	J
8081A	SH-25-WS-00	gamma-BHC	< 40 percent	JTG
8081A	SH-25-WS-00	4,4'-DDE	< 40 percent	JTG
8081A	HI-05-SS-00	alpha-BHC	< 40 percent	J
8081A	HI-05-SS-00	Heptachlor epoxide	< 40 percent	J
8081A	OB-02-SS-00	4,4'-DDD	< 40 percent	J
8081A	OB-02-SS-00	4,4'-DDE	< 40 percent	J
8081A	OB-02-SS-00	Endosulfan I	< 40 percent	J
8081A	OB-01-SS-00	4,4'-DDD	< 40 percent	J
8081A	OB-01-SS-00	4,4'-DDE	< 40 percent	J
8081A	SH-21-WC-12	alpha-BHC	< 40 percent	J
8081A	SH-21-WC-12	4,4'-DDD	< 40 percent	J
8081A	SH-21-WC-12	Endosulfan I	< 40 percent	J
8081A	SH-21-WC-12	Endosulfan II	< 40 percent	J
8081A	SH-21-WC-12	Endrin aldehyde	< 40 percent	J
8081A	SH-21-WC-12	alpha-Chlordane	< 40 percent	J
8081A	SH-16-SC-12	delta-BHC	< 40 percent	J
8081A	SH-16-SC-12	gamma-BHC	< 40 percent	J
8081A	SH-16-SC-12	4,4'-DDE	< 40 percent	J
8081A	SH-16-SC-12	Heptachlor epoxide	< 40 percent	J
8081A	SH-16-SC-12	gamma-Chlordane	< 40 percent	J
8081A	SH-30-WC-12	Aldrin	< 40 percent	J
8081A	SH-30-WC-12	delta-BHC	< 40 percent	J
8081A	SH-30-WC-12	gamma-BHC	< 40 percent	J
8081A	SH-30-WC-12	4,4'-DDE	< 40 percent	J
8081A	SH-30-WC-12	4,4'-DDT	< 40 percent	J
8081A	SH-30-WC-12	Endosulfan I	< 40 percent	J

8081A	SH-30-WC-12	Endosulfan II	< 40 percent	J
8081A	SH-30-WC-12	Endrin ketone	< 40 percent	J
8081A	SH-12-SC-12	4,4'-DDT	< 40 percent	J
8081A	SH-12-SC-12	Endosulfan I	< 40 percent	J
8081A	SH-12-SC-12	Endrin aldehyde	< 40 percent	J
8081A	SH-12-SC-12	alpha-Chlordane	< 40 percent	J
8081A	SH-12-SC-12	gamma-Chlordane	< 40 percent	J
8081A	SH-18-WC-12	4,4'-DDT	< 40 percent	J
8081A	SH-18-WC-12	Endosulfan I	< 40 percent	J
8081A	SH-18-WC-12	Endrin aldehyde	< 40 percent	J
8081A	SH-18-WC-12	gamma-Chlordane	< 40 percent	J

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
JG	Analyte was positively identified. Value may be greater than the reported estimate.
JTG	Analyte was positively identified. Value may be greater than the reported result, which is an estimate below the associated quantitation limit but above the MDL.
UJG	Analyte was not detected at or above the reported estimate with likely low bias.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 16, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11478

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. Te checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
OB-07-SS-00	10/05/08 ; 10:29	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-08-SS-00	10/05/08 ; 11:22	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-07-SS-00	10/05/08 ; 12:21	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-13-SS-00	10/05/08 ; 13:21	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
HI-02-SS-00	10/05/08 ; 14:35	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
HI-03-SS-00	10/05/08 ; 15:26	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
HI-04-SS-00	10/05/08 ; 16:11	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-18-WC-12	10/05/08 ; 17:50	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-11-SS-00	10/03/08 ; 09:40	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-09-SS-00	10/03/08 ; 11:15	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-05-SS-00	10/03/08 ; 11:55	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-17-WS-00	10/03/08 ; 13:04	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-18-WS-00	10/03/08 ; 13:50	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-04-SS-00	10/03/08 ; 14:52	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-06-SS-00	10/03/08 ; 15:35	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
HI-06-SS-00	10/03/08 ; 16:12	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-19-WS-00	10/04/08 ; 09:13	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-10-SS-00	10/04/08 ; 09:51	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-12-SS-00	10/04/08 ; 10:34	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
OB-13-SS-00	10/04/08 ; 11:24	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
OB-14-SS-00	10/04/08 ; 13:25	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons

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Analytical methods

Analysis	Analytical Method	Number of Samples
Metals	EPA method 6020	21
Mercury	EPA method 7471A	21
Pesticides	EPA method 8081A	21
Polychlorinated biphenyls (PCBs)	EPA method 8082	21
Petroleum hydrocarbons	Ecology's NWTPH-HCID	2

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes.
Case narrative present and complete?	Yes
Any holding time violations?	Yes. Twenty-one samples extracted outside of 14 day holding time for PCBs analysis. Samples qualified as estimated, as shown in the table below.

Pesticides and PCBs Checklist

Any compounds present in method blanks?	Yes
For samples, if results are <5 times the blank then "U" flag data.	See table below.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
MS/MSD percent recovery values within laboratory QC criteria?	No. Aroclor 1260 recovery outside of 60-130 percent control limit for MSD analysis of sample HI-03-SS-00 (59 percent).
MS/MSD relative percent difference values within QC criteria of <35%?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	No, aldrin (128 percent), alpha-chlordane (124 percent), and gamma-chlordane (131 percent) exceeded upper limit. All samples ND except those in table below.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes

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Pesticides and PCBs Checklist

Is continuing calibration for target compounds < 20%?	No. Compounds reported from in-control CCV.
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	No
Spot check retention time windows and second column confirmations as complete.	See table below. Sample results that exceeded a relative percent difference of 40% between columns were qualified as estimated (J).

Petroleum Hydrocarbons Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
Laboratory QC frequency of one blank with each batch and one duplicate per 20 samples?	Yes
Duplicate relative percent difference values less than 35 percent?	Yes

Metals Checklist

Any compounds present in method blank?	Yes, see table below.
For samples, if results are <5 times the blank then "U" flag data.	See table below.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes
Were elements recovered $\underline{<}$30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within QC criteria of 80-120%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is there one serial dilution per 20 samples? Are percent difference values within laboratory QC criteria?	Yes
Spot check ICS recoveries 80-120%.	All are acceptable.
Spot check Correlation Coefficient > 0.995.	All are acceptable.
Spot check ICV 90-110%. Contact lab.	All are acceptable.

Metals Checklist

Spot check CCV 90-110% or 80-120% for Hg. Contact lab.	All are acceptable.

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Twenty-one samples were extracted outside of holding time (2, 4, 23, or 24 days) for PCB analysis. PCB results for these samples were qualified as estimated (J) or estimated at the detection limit (UJ), as shown in the table below.

- Heptachlor epoxide and alpha-chlordane were detected in the method blank. Samples with detected concentrations of heptachlor epoxide and alpha-chlordane that were less than 5 times the method blank concentration were qualified as undetected (U), as shown in the table below.

- Several metals were detected in each of the three method blanks, as shown in the table below. With one exception, no samples were qualified because all sample results for all analytes were greater than 5 times the method blank results. The exception was the cadmium result for sample HI-02-SS-00. which was qualified as undetected (U), as shown in the table below.

- Surrogate recoveries for pesticides, PCBs, and HCID analyses of several samples were below the lower laboratory control limits as shown in the table below. Data were qualified because of surrogate recovery value criteria if the recovery value did not meet the EPA CLP limits of 30 to 150 percent, as shown in the table below.

- The percent recovery value for Aroclor 1260 for the MSD analysis of sample HI-03-SS-00 (59 percent) was below the lower laboratory control limit (60 to 130 percent). No data were qualified because the exceedance was marginal (1 percent) and the percent recovery for the MS analysis (63 percent) met the laboratory control limits of 60- to 130

percent.

- The percent recovery values for alpha-chlordane, gamma-chlordane, and aldrin for the LCS analyses exceeded the upper control limits. All associated samples with reported results of alpha-chlordane, gamma-chlordane, and aldrin above the detection limit were qualified as estimated (J), as shown in the table below.

- Several chlorinated pesticides compounds were identified with a RPD value between the primary and secondary columns greater than the 40 percent method limit. As shown in the table below, compounds with a RPD between columns of greater than 40 percent were qualified as estimated.

Samples Analyzed Outside of Holding Time

Method	Sample ID	Analyses	Holding Time	Day Outside of Holding Time	Qualifier
8082	OB-07-SS-00	PCBs	14 days	2	UJ
8082	OB-08-SS-00	PCBs	14 days	2	UJ
8082	SH-07-SS-00	PCBs	14 days	2	UJ
8082	SH-13-SS-00	PCBs	14 days	2	UJ
8082	HI-02-SS-00	PCBs	14 days	2	UJ
8082	HI-03-SS-00	PCBs	14 days	2	UJ
8082	HI-04-SS-00	PCBs	14 days	2	UJ
8082	OB-18-WC-12	PCBs	14 days	2	UJ
8082	OB-11-SS-00	PCBs	14 days	4	UJ
8082	OB-09-SS-00	PCBs	14 days	4	UJ
8082	OB-05-SS-00	PCBs	14 days	24	UJ
8082	OB-17-WS-00	PCBs	14 days	24	UJ
8082	OB-18-WS-00	PCBs	14 days	24	UJ
8082	OB-04-SS-00	PCBs	14 days	24	UJ
8082	OB-06-SS-00	PCBs	14 days	24	UJ
8082	HI-06-SS-00	PCBs	14 days	24	UJ or J
8082	OB-19-WS-00	PCBs	14 days	23	UJ
8082	OB-10-SS-00	PCBs	14 days	23	UJ
8082	OB-12-SS-00	PCBs	14 days	23	UJ
8082	OB-13-SS-00	PCBs	14 days	23	UJ
8082	OB-14-SS-00	PCBs	14 days	23	UJ

Positive Blanks

Method	Sample ID	Blank Type	Compound	Result	Flag	Units	RL
8081A	MB-580-36860	Method	Heptachlor epoxide	0.073	J	ug/L	1.0
8081A	MB-580-36860	Method	alpha-Chlordane	0.55	J	ug/L	1.0
6020	MB-580-36872	Method	Cadmium	0.0023	J	mg/kg	0.20
6020	MB-580-36872	Method	Chromium	0.0097	J	mg/kg	0.20
6020	MB-580-36872	Method	Lead	0.0023	J	mg/kg	0.20
6020	MB-580-36872	Method	Silver	0.0011	J	mg/kg	0.20
6020	MB-580-36872	Method	Zinc	0.033	J	mg/kg	0.70
6020	MB-580-36873	Method	Cadmium	0.0026	J	mg/kg	0.20
6020	MB-580-36873	Method	Chromium	0.017	J	mg/kg	0.20
6020	MB-580-36873	Method	Copper	0.0044	J	mg/kg	0.20
6020	MB-580-36873	Method	Lead	0.0057	J	mg/kg	0.20
6020	MB-580-36873	Method	Nickel	0.019	J	mg/kg	0.20
6020	MB-580-36873	Method	Silver	0.0038	J	mg/kg	0.20
6020	MB-580-36873	Method	Zinc	0.030	J	mg/kg	0.70
6020	MB-580-36875	Method	Chromium	0.0076	J	mg/kg	0.20
6020	MB-580-36875	Method	Lead	0.0011	J	mg/kg	0.20
6020	MB-580-36875	Method	Silver	0.0011	J	mg/kg	0.20

Samples Qualified for Positive Method Blank Results

Method	Sample ID	Compound	Result	Units	Qualifier
8081A	OB-05-SS-00	alpha-Chlordane	0.98	ug/kg	U
8081A	OB-13-SS-00	Heptachlor epoxide	0.13	ug/kg	U
8081A	OB-13-SS-00	alpha-Chlordane	0.28	ug/kg	U
8081A	OB-14-SS-00	Heptachlor epoxide	0.051	ug/kg	U
8081A	OB-14-SS-00	alpha-Chlordane	0.26	ug/kg	U
6020	HI-02-SS-00	Cadmium	0.11	mg/kg	U

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Samples with Surrogate Recoveries Outside Laboratory Control Limits

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8081A	OB-07-SS-00	Decachlorobiphenyl	39	40-158	30-150	None
8081A	HI-04-SS-00	Decachlorobiphenyl	39	40-158	30-150	None
8082	OB-07-SS-00	Decachlorobiphenyl	38	60-125	30-150	None
8082	OB-08-SS-00	Decachlorobiphenyl	45	60-125	30-150	None
8082	SH-07-SS-00	Decachlorobiphenyl	54	60-125	30-150	None
8082	SH-13-SS-00	Decachlorobiphenyl	41	60-125	30-150	None
8082	HI-02-SS-00	Decachlorobiphenyl	51	60-125	30-150	None
8082	HI-03-SS-00	Decachlorobiphenyl	41	60-125	30-150	None
8082	HI-04-SS-00	Decachlorobiphenyl	46	60-125	30-150	None
8082	OB-18-WC-12	Tetrachloro-m-xylene	39	45-155	30-150	None
8082	OB-18-WC-12	Decachlorobiphenyl	25	60-125	30-150	UJ
8082	OB-11-SS-00	Decachlorobiphenyl	24	60-125	30-150	UJ
8082	OB-09-SS-00	Decachlorobiphenyl	48	60-125	30-150	None
8082	OB-17-WC-00	Decachlorobiphenyl	56	60-125	30-150	None
8082	OB-18-WS-00	Decachlorobiphenyl	51	60-125	30-150	None
8082	OB-04-SS-00	Decachlorobiphenyl	47	60-125	30-150	None
8082	OB-06-SS-00	Decachlorobiphenyl	57	60-125	30-150	None
8082	OB-19-WS-00	Decachlorobiphenyl	48	60-125	30-150	None
8082	OB-10-SS-00	Decachlorobiphenyl	59	60-125	30-150	None
8082	OB-12-SS-00	Decachlorobiphenyl	59	60-125	30-150	None
8082	OB-13-SS-00	Decachlorobiphenyl	56	60-125	30-150	None
HCID	OB-13-SS-00	4-Bromofluorbenzene	24	50-150	NA	UJ
HCID	OB-13-SS-00	o-Terphenyl	18	50-150	NA	UJ

Duplicate or Triplicate Results Outside Control Limits

No duplicate or triplicate results outside control limits

Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Compound	MS % Rec	MSD %Rec	Limits	Qualifier
8082	HI-03-SS-00	Aroclor 1260	63	59	60-130	None

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Laboratory: Test America Tacoma	Laboratory Work Order : 11478

Samples Qualified for Laboratory Control Sample Recoveries Outside Control Limits

Method	Sample ID	Compound	LCS % REC	Lab Limits	Qualifier
8081A	SH-07-SS-00	alpha-Chlordane	124	46-118	J
8081A	SH-13-SS-00	alpha-Chlordane	124	46-118	J
8081A	SH-13-SS-00	gamma-Chlordane	131	49-122	J

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

No compounds reported form reanalysis or dilution.

Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

Method	Sample ID	Compound	Limits	Qualifier
8081A	OB-07-SS-00	alpha-BHC	< 40 percent	J
8081A	OB-07-SS-00	Dieldrin	< 40 percent	J
8081A	OB-07-SS-00	Endosulfan I	< 40 percent	J
8081A	SH-07-SS-00	alpha-BHC	< 40 percent	J
8081A	SH-07-SS-00	4,4'-DDE	< 40 percent	J
8081A	SH-07-SS-00	4,4'-DDT	< 40 percent	J
8081A	SH-07-SS-00	Endosulfan I	< 40 percent	J
8081A	SH-07-SS-00	alpha-Chlordane	< 40 percent	J
8081A	SH-13-SS-00	4,4'-DDE	< 40 percent	J
8081A	SH-13-SS-00	Endosulfan I	< 40 percent	J
8081A	SH-13-SS-00	gamma-Chlordane	< 40 percent	J
8081A	HI-02-SS-00	Endosulfan I	< 40 percent	J
8081A	HI-02-SS-00	Heptachlor epoxide	< 40 percent	J
8081A	HI-04-SS-00	Endosulfan I	< 40 percent	J
8081A	OB-09-SS-00	Heptachlor	< 40 percent	J
8081A	OB-05-SS-00	gamma-BHC	< 40 percent	J
8081A	OB-05-SS-00	4,4'-DDD	< 40 percent	J
8081A	OB-05-SS-00	4,4'-DDT	< 40 percent	J
8081A	OB-04-SS-00	alpha-BHC	< 40 percent	J
8081A	OB-12-SS-00	4,4'-DDT	< 40 percent	J
8081A	OB-12-SS-00	Endosulfan sulfate	< 40 percent	J
8081A	OB-13-SS-00	Endrin	< 40 percent	J
8081A	OB-14-SS-00	4,4'-DDT	< 40 percent	J
8081A	OB-14-SS-00	Endrin	< 40 percent	J

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Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
JG	Analyte was positively identified. Value may be greater than the reported estimate.
JTG	Analyte was positively identified. Value may be greater than the reported result, which is an estimate below the associated quantitation limit but above the MDL.
UJG	Analyte was not detected at or above the reported estimate with likely low bias.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11513, 11566, and 11601

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
OB-17-WC-12	10/06/08 ; 10:35	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-29-WC-12	10/06/08 ; 13:15	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-27-WC-12	10/06/08 ; 14:15	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-26-WC-12	10/06/08 ; 15:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SSH-08-SC-12	10/06/08 ; 16:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-22-WC-12	10/07/08 ; 08:50	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-02-SC-12	10/07/08 ; 10:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
SH-20-WC-12	10/07/08 ; 12:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
OB-19-WC-12	10/05/08 ; 15:40	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
RF-01-SS-00	10/09/08 ; 11:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
RF-02-SS-00	10/09/08 ; 14:15	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
RF-03-SS-00	10/09/08 ; 15:30	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls, petroleum hydrocarbons
SH-11-SC-12	10/14/08 ; 12:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-19-WC-12	10/14/08 ; 13:45	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls

Analytical methods

Analysis	Analytical Method	Number of Samples
Metals	EPA method 6020	14
Mercury	EPA method 7471A	14
Pesticides	EPA method 8081A	14
Polychlorinated biphenyls (PCBs)	EPA method 8082	14
Petroleum hydrocarbons	Ecology's NWTPH-HCID	4

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General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes.
Case narrative present and complete?	Yes
Any holding time violations?	Yes. Sample OB-19-WC-12 extracted 3 days outside of the 14 day holding time. Five samples prepared 1 day outside of holding time for mercury. See table below.

Pesticides and PCBs Checklist

Any compounds present in method blanks?	Yes. Heptachlor epoxide present in method blank associated with work orders 11566 and 11601. No samples qualified; all samples ND or greater than 5 times method blank value.
For samples, if results are <5 times the blank then "U" flag data.	None
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	No, see table below.
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
MS/MSD percent recovery values within laboratory QC criteria?	Yes
MS/MSD relative percent difference values within QC criteria of <35%?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	No
Spot check retention time windows and second column confirmations as complete.	See table below. Sample results that exceeded a relative percent difference of 40% between columns were qualified as estimated (J).

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Petroleum Hydrocarbons Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
Laboratory QC frequency of one blank with each batch and one duplicate per 20 samples?	Yes
Duplicate relative percent difference values less than 35 percent?	Yes

Metals Checklist

Any compounds present in method blank?	Yes, see table below.
For samples, if results are <5 times the blank then "U" flag data.	None less than 5 times blank result.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	No. Batch sample MS recovery result for chromium was 74%. No data flagged because failure was minimal and MSD met control limits.
Were elements recovered <u>≤</u>30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within QC criteria of 80-120%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is there one serial dilution per 20 samples? Are percent difference values within laboratory QC criteria?	Yes
Spot check ICS recoveries 80-120%.	All are acceptable.
Spot check Correlation Coefficient > 0.995.	All are acceptable.
Spot check ICV 90-110%. Contact lab.	All are acceptable.
Spot check CCV 90-110% or 80-120% for Hg. Contact lab.	All are acceptable.

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Sample OB-19-WC-12 was extracted one day outside of holding time for pesticide and PCB analyses. Sample results were qualified as estimated (UJ or J) as shown in the table below.

- Five samples were analyzed one day outside of holding time (28 days) for mercury. Because the exceedance was only one day, no samples were qualified.

- Heptachlor epoxide was detected in the method blank for sample batch 37339. No data were qualified because all associated samples were either not detected or were reported at a concentration 5 times the method blank concentration.

- Several metals were detected in the method blank for sample batch 37173, as shown in the table below. No samples were qualified because all sample results for all analytes were greater than 5 times the method blank results.

- Surrogate recoveries for pesticides, PCBs, and HCID analyses of several samples were outside the laboratory control limits as shown in the table below. Data were qualified because of surrogate recovery value criteria if the recovery value did not meet the EPA CLP limits of 30 to 150 percent, as shown in the table below.

- The percent recovery value for chromium (74 percent) in the MS analyses of batch sample SH-13-SC-12 exceeded the laboratory control limits (75 to 125 percent). No results were qualified because the exceedance was marginal (1 percent) and the MSD percent recovery was within control limits.

- Several chlorinated pesticides compounds were identified with a RPD value between the primary and secondary columns greater than the 40 percent method limit. As shown in the table below, compounds with a RPD between columns of greater than 40 percent were qualified as estimated.

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Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11513, 11566, and 11601

Samples Analyzed Outside of Holding Time

Method	Sample ID	Analyses	Holding Time	Day Outside of Holding Time	Qualifier
8081A	OB-19-WC-12	Pesticides	14 days	3	UJ or J
8082	OB-19-WC-12	PCBs	14 days	3	UJ
7471A	OB-17-WC-12	Total mercury	28 days	1	None
7471A	SH-29-WC-12	Total mercury	28 days	1	None
7471A	SH-27-WC-12	Total mercury	28 days	1	None
7471A	SH-26-WC-12	Total mercury	28 days	1	None
7471A	SH-08-SC-12	Total mercury	28 days	1	None

Positive Blanks

Method	Sample ID	Blank Type	Compound	Result	Flag	Units	RL
8081A	MB-580-37339	Method	Heptachlor epoxide	0.0077	J	ug/L	1.0
6020	MB-580-37173	Method	Arsenic	0.0025	J	mg/kg	0.20
6020	MB-580-37173	Method	Cadmium	0.0013	J	mg/kg	0.20
6020	MB-580-37173	Method	Chromium	0.024	J	mg/kg	0.20
6020	MB-580-37173	Method	Copper	0.0086	J	mg/kg	0.20
6020	MB-580-37173	Method	Lead	0.0044	J	mg/kg	0.20
6020	MB-580-37173	Method	Nickel	0.028	J	mg/kg	0.20
6020	MB-580-37173	Method	Silver	0.0022	J	mg/kg	0.20
6020	MB-580-37173	Method	Zinc	0.19	J	mg/kg	0.70

Samples Qualified for Positive Method Blank Results

No samples qualified for positive method blank results.

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Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11513, 11566, and 11601

Samples with Surrogate Recoveries Outside Laboratory Control Limits

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8081A	Method Blank	Tetrachloro-m-xylene	144	49-123	30-150	None
8081A	SH-27-WC-12	Tetrachloro-m-xylene	147	49-123	30-150	None
8081A	SH-26-WC-12	Tetrachloro-m-xylene	127	49-123	30-150	None
8081A	SH-02-SC-12	Decachlorobiphenyl	29	40-158	30-150	UJ or J
8081A	SH-20-WC-12	Tetrachloro-m-xylene	139	49-123	30-150	None
8082	Method Blank	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	Method Blank	Decachlorobiphenyl	49	60-125	30-150	None
8082	OB-17-WC-12	Decachlorobiphenyl	33	60-125	30-150	None
8082	SH-29-WC-12	Decachlorobiphenyl	35	60-125	30-150	None
8082	SH-27-WC-12	Tetrachloro-m-xylene	31	45-155	30-150	None
8082	SH-27-WC-12	Decachlorobiphenyl	27	60-125	30-150	UJ
8082	SH-26-WC-12	Tetrachloro-m-xylene	35	45-155	30-150	None
8082	SH-26-WC-12	Decachlorobiphenyl	36	60-125	30-150	None
8082	SH-08-SC-12	Tetrachloro-m-xylene	44	45-155	30-150	None
8082	SH-08-SC-12	Decachlorobiphenyl	36	60-125	30-150	None
8082	SH-22-WC-12	Tetrachloro-m-xylene	22	45-155	30-150	UJ
8082	SH-22-WC-12	Decachlorobiphenyl	18	60-125	30-150	UJ
8082	SH-02-SC-12	Tetrachloro-m-xylene	26	45-155	30-150	UJ
8082	SH-02-SC-12	Decachlorobiphenyl	18	60-125	30-150	UJ
8082	SH-20-WC-12	Tetrachloro-m-xylene	30	45-155	30-150	None
8082	SH-20-WC-12	Decachlorobiphenyl	28	60-125	30-150	UJ
HCID	SH-02-SC-12	4-Bromofluorobenzene	31	50-150	NA	UJ or J
HCID	SH-02-SC-12	o-Terphenyl	36	50-150	NA	UJ or J
8081A	OB-19-WC-12	Decachlorobiphenyl	31	40-158	30-150	None
8082	OB-19-WC-12	Decachlorobiphenyl	43	60-125	30-150	None
8082	RF-01-SS-00	Decachlorobiphenyl	52	60-125	30-150	None
8082	RF-02-SS-00	Decachlorobiphenyl	50	60-125	30-150	None
8082	RF-03-SS-00	Decachlorobiphenyl	54	60-125	30-150	None
HCID	RF-01-SS-00	4-Bromofluorobenzene	39	50-150	NA	UJ
HCID	RF-01-SS-00	o-Terphenyl	30	50-150	NA	UJ
HCID	RF-02-SS-00	4-Bromofluorobenzene	42	50-150	NA	UJ
HCID	RF-02-SS-00	o-Terphenyl	27	50-150	NA	UJ
8082	SH-11-SC-12	Decachlorobiphenyl	45	60-125	30-150	None
8082	SH-19-WC-12	Decachlorobiphenyl	51	60-125	30-150	None

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11513, 11566, and 11601

Duplicate or Triplicate Results Outside Control Limits

No duplicate or triplicate results outside of control limits.

Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Compound	MS % Rec	MSD %Rec	Limits	Qualifier
6020	Batch	Chromium	74	83	75-125	None

Samples Qualified for Laboratory Control Sample Recoveries Outside Control Limits

No laboratory control sample recoveries outside control limits.

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

No compounds reported form reanalysis or dilution.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11513, 11566, and 11601

Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

Method	Sample ID	Compound	Limits	Qualifier
8081A	SH-29-WC-12	delta-BHC	< 40 percent	J
8081A	SH-29-WC-12	4,4'-DDD	< 40 percent	J
8081A	SH-29-WC-12	Endosulfan II	< 40 percent	J
8081A	SH-27-WC-12	Aldrin	< 40 percent	J
8081A	SH-27-WC-12	gamma-BHC	< 40 percent	J
8081A	SH-27-WC-12	Endosulfan sulfate	< 40 percent	J
8081A	SH-26-WC-12	alpha-BHC	< 40 percent	J
8081A	SH-26-WC-12	delta-BHC	< 40 percent	J
8081A	SH-26-WC-12	Dieldrin	< 40 percent	J
8081A	SH-08-SC-12	Aldrin	< 40 percent	J
8081A	SH-08-SC-12	beta-BHC	< 40 percent	J
8081A	SH-08-SC-12	gamma-BHC	< 40 percent	J
8081A	SH-08-SC-12	Heptachlor	< 40 percent	J
8081A	SH-22-WC-12	Heptachlor epoxide	< 40 percent	J
8081A	SH-02-SC-12	4,4'-DDD	< 40 percent	J
8081A	SH-02-SC-12	4,4'-DDT	< 40 percent	J
8081A	SH-20-WC-12	alpha-BHC	< 40 percent	J
8081A	SH-20-WC-12	4,4'-DDD	< 40 percent	J
8081A	OB-19-WC-12	delta-BHC	< 40 percent	J
8081A	OB-19-WC-12	4,4'-DDE	< 40 percent	J
8081A	OB-19-WC-12	4,4'-DDT	< 40 percent	J
8081A	OB-19-WC-12	Endrin aldehyde	< 40 percent	J
8081A	OB-19-WC-12	alpha-Chlordane	< 40 percent	J
8081A	RF-01-SS-00	alpha-Chlordane	< 40 percent	J
8081A	RF-02-SS-00	4,4'-DDD	< 40 percent	J
8081A	RF-02-SS-00	Heptachlor epoxide	< 40 percent	J
8081A	RF-03-SS-00	alpha-Chlordane	< 40 percent	J
8081A	SH-11-SC-12	4,4'-DDT	< 40 percent	J
8081A	SH-19-WC-12	Methoxychlor	< 40 percent	J
8081A	SH-19-WC-12	alpha-Chlordane	< 40 percent	J

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11513, 11566, and 11601

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
UJ	Analyte was not detected at or above the reported estimate.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 13, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11617

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
SH-01-SS-00	10/15/08 ; 09:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-02-SS-00	9/30/08 ; 11:40	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-10-SS-00	9/30/08 ; 13:10	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-14-SS-00	9/30/08 ; 14:00	Sediment	Metals, mercury, pesticides, polychlorinated biphenyls
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210
SH-17-RI-0/3	10/15/08 ; 16:00	Sediment	Lead-210

Analytical methods

Analysis	Analytical Method	Number of Samples
Metals	EPA method 6020	4
Mercury	EPA method 7471A	4
Pesticides	EPA method 8081A	4
Polychlorinated biphenyls (PCBs)	EPA method 8082	4
Lead-210	RL-GAM-001	14

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 13, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11617

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes.
Case narrative present and complete?	Yes
Any holding time violations?	No

Pesticides and PCBs Checklist

Any compounds present in method blanks?	Yes, heptachlor epoxide detected in blank.
For samples, if results are <5 times the blank then "U" flag data.	See table below. One sample flagged as U.
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, refer to table below. Surrogate recoveries were within EPA limits, so no data were qualified.
MS/MSD percent recovery values within laboratory QC criteria?	Yes
MS/MSD relative percent difference values within QC criteria of <35%?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	No. However qualified compounds reported from column with CCV <20%
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	No
Spot check retention time windows and second column confirmations as complete.	See table below. Sample results that exceeded a relative percent difference of 40% between columns were qualified as estimated bias low (JG,UJG, or JTG).

Metals Checklist

Any compounds present in method blank?	Yes, see table below.
For samples, if results are <5 times the blank then "U" flag data.	All results were greater than 5 times the blank result. No data were qualified.

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Laboratory: Test America Tacoma	Laboratory Work Order : 11617

Metals Checklist

Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	No. MS recovery result for chromium was 74%. No data flagged because failure was minimal and MSD met control limits.
Were elements recovered $\leq$30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within QC criteria of 80-120%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is there one serial dilution per 20 samples? Are percent difference values within laboratory QC criteria?	Yes
Spot check ICS recoveries 80-120%.	All are acceptable.
Spot check Correlation Coefficient > 0.995.	All are acceptable.
Spot check ICV 90-110%. Contact lab.	All are acceptable.
Spot check CCV 90-110% or 80-120% for Hg. Contact lab.	All are acceptable.

Gamma Spectroscopy Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one duplicate per 20 samples?	Yes
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within QC criteria of 80-120%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Arsenic, cadmium, copper, lead, nickel, silver, and zinc were detected in the method blank. No samples were qualified because all sample results for all analytes were greater than 5 times the method blank results.

- Surrogate recoveries for PCB analyses of sample SH-04-SC-12 were

below the lower laboratory control limits as shown in the table below. Data were not qualified because the surrogate recovery values met the EPA CLP limits of 30 to 150 percent, as specified in the SAP.

- The percent recovery value for chromium (74 percent) in the MS analyses of sample SH-13-SC-12 exceeded the laboratory control limits (75 to 125 percent). No results were qualified because the exceedance was marginal (1 percent) and the MSD percent recovery was within control limits.

- Several chlorinated pesticides compounds were identified with a RPD value between the primary and secondary columns greater than the 40 percent method limit. The lower of the two values were reported by the laboratory for all samples. As shown in the table below, compounds with a RPD between columns of greater than 40 percent were qualified as estimated biased low.

Positive Blanks

Method	Sample ID	Blank Type	Compound	Result	Flag	Units	RL
8081A	MB-580-37339	Method	Heptachlor epoxide	0.0077	JTG	Ug/L	1.0
6020	MB-580-36868	Method	Arsenic	0.0025	J	mg/kg	0.20
6020	MB-580-37173	Method	Cadmium	0.0013	J	mg/kg	0.20
6020	MB-580-37173	Method	Chromium	0.024	J	mg/kg	0.20
6020	MB-580-37173	Method	Copper	0.0086	J	mg/kg	0.20
6020	MB-580-37173	Method	Lead	0.0044	J	mg/kg	0.20
6020	MB-580-37173	Method	Nickel	0.028	J	mg/kg	0.20
6020	MB-580-37173	Method	Silver	0.0022	J	mg/kg	0.20
6020	MB-580-37173	Method	Zinc	0.19	J	mg/kg	0.70

Samples Qualified for Positive Method Blank Results

Method	Sample ID	Compound	Result	Units	Qualifier
8081A	SH-04-SC-12	Heptachlor epoxide	0.021	ug/kg	UJG

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Date Completed: January 13, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11617

Samples Qualified for Surrogate Recoveries Outside Control Limits

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8082	SH-04-SC-12	Tetrachloro-m-xylene	43	45-155	30-150	None
8082	SH-04-SC-12	Decachlorobiphenyl	32	60-125	30-150	None

Duplicate or Triplicate Results Outside Control Limits

No duplicate results outside of control limits

Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Type	Compound	% Rec	Limits	Qualifier
6020	SH-13-SC-12	MS	Chromium	74	75-125	None

Samples Qualified for Laboratory Control Sample Recoveries Outside Control Limits

Method	Sample ID	Compound	LCS % REC	Lab Limits	Qualifier
8081A	SH-14-SS-00	beta-BHC	127	48-121	J
8081A	SH-14-SC-12	beta-BHC	127	48-121	J
8081A	SH-23-WC-12	beta-BHC	127	48-121	J

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

No compounds reported form reanalysis or dilution.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 13, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11617

Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

Method	Sample ID	Compound	Limits	Qualifier
8081A	SH-13-SC-12	Endosulfan II	< 40 percent	JTG
8081A	SH-13-SC-12	Endrin aldehyde	< 40 percent	JTG
8081A	SH-04-SC-12	alpha-BHC	< 40 percent	JG
8081A	SH-04-SC-12	Endosulfan I	< 40 percent	JTG
8081A	SH-04-SC-12	Heptachlor epoxide	< 40 percent	UJG
8081A	SH-04-SC-12	Methoxychlor	< 40 percent	JTG
8081A	SH-04-SC-12	alpha-Chlordane	< 40 percent	JTG
8081A	SH-05-SC-12	alpha-Chlordane	< 40 percent	JTG
8081A	SH-07-SC-12	delta-BHC	< 40 percent	JTG
8081A	SH-07-SC-12	4,4'-DDD	< 40 percent	JTG
8081A	SH-07-SC-12	4,4'-DDT	< 40 percent	JTG
8081A	SH-07-SC-12	alpha-Chlordane	< 40 percent	JTG

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
JG	Analyte was positively identified. Value may be greater than the reported estimate.
JTG	Analyte was positively identified. Value may be greater than the reported result, which is an estimate below the associated quantitation limit but above the MDL.
UJG	Analyte was not detected at or above the reported estimate with likely low bias.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 13, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11629 and 11687

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
OB-15-RI-0/3	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-10/12	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-19/21	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-28/30	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-37/39	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-46/48	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-55/57	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-64/66	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-73/75	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-82/84	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-91/93	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-100/102	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-109/111	10/16/08 ; 11:45	Sediment	Lead-210
OB-15-RI-118/120	10/16/08 ; 11:45	Sediment	Lead-210
OB-16-RI-0/3	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-10/12	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-19/21	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-28/30	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-37/39	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-46/48	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-55/57	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-64/66	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-73/75	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-82/84	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-91/93	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-100/102	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-109/111	10/20/08 ; 11:30	Sediment	Lead-210
OB-16-RI-118/120	10/20/08 ; 11:30	Sediment	Lead-210

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 13, 2009	Review Completed by: Gina Catarra
Laboratory: Test America Tacoma	Laboratory Work Order : 11629 and 11687

Analytical methods

Analysis	Analytical Method	Number of Samples
Lead-210	RL-GAM-001	28

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes.
Case narrative present and complete?	Yes
Any holding time violations?	No

Gamma Spectroscopy Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one duplicate per 20 samples?	Yes
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within QC criteria of 80-120%? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- None

Positive Blanks

No positive blanks

Samples Qualified for Positive Method Blank Results

No samples qualified for positive method blank results

Duplicate or Triplicate Results Outside Control Limits

No duplicate results outside of control limits.

Samples Qualified for Laboratory Control Sample Recoveries Outside Control Limits

No LCS recovery values outside of control limits.

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

No samples reanalyzed or diluted.

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 23, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NT34, NT35, NT36 and NT37

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 23, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NT34, NT35, NT36 and NT37

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
OB-19-WS-00	10/04/08 ; 09:13	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
OB-10-SS-00	10/04/08 ; 09:51	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-12-SS-00	10/04/08 ; 10:34	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-13-SS-00	10/04/08 ; 11:24	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-14-SS-00	10/04/08 ; 13:25	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-04-SC-12	10/04/08 ; 11:40	Sediment	Grain size, TOC, ammonia, sulfides
OB-12-SC-12	10/04/08 ; 16:00	Sediment	Grain size, TOC, ammonia, sulfides
OB-05-SC-12	10/04/08 ; 16:55	Sediment	Grain size, TOC, ammonia, sulfides
OB-11-SS-00	10/03/08 ; 09:40	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-09-SS-00	10/03/08 ; 11:15	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-05-SS-00	10/03/08 ; 11:55	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-17-WS-00	10/03/08 ; 13:04	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
OB-17-WS-00	10/03/08 ; 13:50	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
OB-04-SS-00	10/03/08 ; 14:52	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-06-SS-00	10/03/08 ; 15:35	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
HI-06-SS-00	10/03/08 ; 16:12	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-03-SC-12	10/03/08 ; 12:25	Sediment	Grain size, TOC, ammonia, sulfides
OB-02-SC-12	10/03/08 ; 13:25	Sediment	Grain size, TOC, ammonia, sulfides
HI-07-SC-12	10/03/08 ; 15:10	Sediment	Grain size, TOC, ammonia, sulfides
OB-01-SC-12	10/03/08 ; 16:00	Sediment	Grain size, TOC, ammonia, sulfides
OB-07-SS-00	10/05/08 ; 10:29	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-08-SS-00	10/05/08 ; 11:22	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-07-SS-00	10/05/08 ; 12:21	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-13-SS-00	10/05/08 ; 13:21	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
HI-02-SS-00	10/05/08 ; 14:35	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
HI-03-SS-00	10/05/08 ; 15:26	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
HI-04-SS-00	10/05/08 ; 16:11	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-10-SC-12	10/05/08 ; 11:50	Sediment	Grain size, TOC, ammonia, sulfides
OB-09-SC-12	10/05/08 ; 13:30	Sediment	Grain size, TOC, ammonia, sulfides
OB-06-SC-12	10/05/08 ; 16:45	Sediment	Grain size, TOC, ammonia, sulfides
OB-18-SC-12	10/05/08 ; 17:50	Sediment	Grain size, TOC, ammonia, sulfides
OB-19-WC-12	10/05/08 ; 15:40	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
OB-17-WC-12	10/06/08 ; 10:25	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
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Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NT34, NT35, NT36 and NT37

HI-06-SC-12	10/06/08 ; 11:45	Sediment	Grain size, TOC, ammonia, sulfides
SH-29-WC-12	10/06/08 ; 13:15	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-26-WC-12	10/06/08 ; 15:30	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-27-WC-12	10/06/08 ; 15:30	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-08-SC-12	10/06/08 ; 16:30	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs,
SH-22-WC-12	10/07/08 ; 08:50	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-02-SC-12	10/07/08 ; 10:30	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs,
SH-20-WC-12	10/07/08 ; 12:00	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
OB-14-SC-12	10/07/08 ; 17:10	Sediment	Grain size, TOC, ammonia, sulfides

Analytical methods

Analysis	Analytical Method	Number of Samples
Grain size	PSEP	42
TOC	Plumb, 1981	42
TVS	EPA 160.4	10
Ammonia	EPA 350.1	42
Total sulfides	EPA 376.2	42
SVOCs	EPA 8270D	29
Tributyltins	Krone 1988	1
Resin acids	EPA 8270D	11

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	No. Five of 12 coolers arrived at 7 to 8 degrees. No data flagged.
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes
Case narrative present and complete?	Yes
Any holding time violations?	No

Conventionals Checklist

Any positive method blank results?	No

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 23, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NT34, NT35, NT36 and NT37

Conventionals Checklist

Laboratory QC frequency of one blank and LCS with each batch and one set of MS and triplicates per 20 samples (if applicable)?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%?	No. See table below.
Triplicate relative standard deviation (RSD) or duplicate relative percent difference (RPD) within QC limits of less than 20%?	No. See table below.
LCS percent recovery values within QC criteria of 80-120%?	Yes
Are calibration correlation coefficients > 0.995?	Yes
Are ICV percent recovery values 90-110%?	Yes
Are CCV percent recovery values 90-110% or 85-115% for total sulfides?	Yes

Semivolatile Organic Compound Checklist

Any compounds present in method blanks?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	Yes
MS/MSD percent recovery values within laboratory QC criteria?	Yes
MS/MSD relative percent difference values within laboratory QC criteria?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	Yes. See table below.
Spot check retention time windows and second column confirmations as complete.	All acceptable

Resin Acids Checklist

Any compounds present in method blanks?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 23, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NT34, NT35, NT36 and NT37

Resin Acids Checklist

Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	Yes
MS/MSD percent recovery values within laboratory QC criteria?	Yes
MS/MSD relative percent difference values within laboratory QC criteria?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	No. See table below.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	Yes. See table below.
Spot check retention time windows and second column confirmations as complete.	Yes

Tributyltins Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes
Were elements recovered ≤30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Surrogate recovery values for samples within laboratory QC limits?	Yes
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	No
Spot check retention time windows and second column confirmations as complete.	Yes

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Five of the 12 coolers were received at 7 to 8 deg C. Minor exceedance, no data qualified.

- The relative percent difference (RPD) value for the duplicate analysis of sample OB-05-SS-00 (27 percent) for sulfides exceeded the less than 20 percent criterion. Because all other QC data were within control for the sulfides analyses, only sample OB-05-SS-00 was qualified at estimated (J).

- The percent recovery value for the matrix spike analysis of sample OB-17-WC-12 (158 percent) for sulfides exceeded the method control limits (75 to 125 percent). Because all other QC data were within control for the sulfides analyses, only sample OB-17-WC-12 was qualified at estimated (J).

- The percent recovery for neoabietic acid in the laboratory control (27 percent) and laboratory control duplicate (20 percent) samples exceeded the 30 to 160 percent control limits. Results for neoabietic acid were qualified as estimated at the detection limit (UJ), as shown in the table below.

- Samples SH-22-WC-12, SH-20-WC-12, OB-18-WC-12, OB-19-WC-12, and SH-27-WC-12 were reanalyzed at a dilution because one or more compounds were reported at a concentration greater than the upper calibration range, as shown in the table below.

Positive Blanks

No positive blank results.

Samples Qualified for Positive Method Blank Results

No samples qualified for positive method blank results.

Samples with Surrogate Recoveries Outside Laboratory Control Limits

No samples with surrogate recoveries outside laboratory control limits.

Duplicate or Triplicate Results Outside Control Limits

Method	Sample ID	Compound	% RPD	Limits	Qualifier
EPA 376.2	OB-17-WC-12	Sulfide	27	0-20	J

Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Compound	MS % Rec	MSD %Rec	Limits	Qualifier
EPA 376.2	OB-17-WC-12	Sulfide	158	NA	75-125	J

Laboratory Control Sample Recoveries Outside Control Limits

Method	Sample ID	Compound	LCS % REC	Lab Limits	Qualifier
Resin	OB-19-WS-00	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	OB-17-WS-00	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	OB-18-WS-00	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	OB-18-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	OB-19-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	OB-17-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	SH-29-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	SH-26-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	SH-27-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	SH-22-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ
Resin	SH-20-WC-12	Neoabietic acid	27 / 20 (LCSD)	30-160	UJ

Samples Qualified for Internal Standard Recoveries Outside Control Limits

No samples qualified for internal standard recoveries outside control limits.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 23, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NT34, NT35, NT36 and NT37

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

Sample ID	Compound	Reason for reanalysis
SH-22-WC-12	Retene	Result exceeded linear range. Reanalyzed at a 15x dilution.
SH-20-WC-12	Retene	Result exceeded linear range. Reanalyzed at a 20x dilution.
OB-18-WC-12	Abietic acid	Result exceeded linear range. Reanalyzed at a 3x dilution.
OB-19-WC-12	Abietic acid	Result exceeded linear range. Reanalyzed at a 10x dilution.
SH-27-WC-12	Isopimaric acid	Result exceeded linear range. Reanalyzed at a 10x dilution.
SH-27-WC-12	Dehydroabietic acid	Result exceeded linear range. Reanalyzed at a 10x dilution.
SH-27-WC-12	Abietic acid	Result exceeded linear range. Reanalyzed at a 10x dilution.
SH-22-WC-12	Abietic acid	Result exceeded linear range. Reanalyzed at a 50x dilution.

Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

No samples qualified for confirmation column percent difference values outside control limits.

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
UJ	Analyte was not detected at or above the reported estimate.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS27, NT66 and NT67

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
SH-01-SS-00	9/29/08 ; 18:05	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, TBT
SH-02-SS-00	9/30/08 ; 10:30	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, TBT
SH-10-SS-00	9/30/08 ; 13:40	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-14-SS-00	9/30/08 ; 15:05	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-22-WS-00	9/30/08 ; 16:48	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, resin acids
SH-23-WS-00	9/30/08 ; 15:43	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, resin acids
SH-26-WS-00	9/30/08 ; 12:50	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, resin acids
SH-27-WS-00	9/30/08 ; 11:55	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, resin acids
SH-28-WS-00	9/30/08 ; 14:29	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, resin acids
SH-10-SC-12	09/30/08 ; 14:50	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-14-SC-12	09/30/08 ; 17:30	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-23-WC-12	09/30/08 ; 18:20	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-28-WC-12	09/30/08 ; 19:00	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
OB-11-SC-12	10/08/08 ; 09:40	Sediment	Grain size, TOC, ammonia, sulfides
OB-13-SC-12	10/08/08 ; 10:40	Sediment	Grain size, TOC, ammonia, sulfides
RF-01-SS-00	10/09/08 ; 11:00	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, TBT, resin acids
RF-02-SS-00	10/09/08 ; 14:15	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, TBT, resin acids
RF-03-SS-00	10/09/08 ; 15:30	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, TBT, resin acids

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS27, NT66 and NT67

Analytical methods

Analysis	Analytical Method	Number of Samples
Grain size	PSEP	18
TOC	Plumb, 1981	18
TVS	EPA 160.4	5
Ammonia	EPA 350.1	18
Total sulfides	EPA 376.2	18
SVOCs	EPA 8270D	16
Tributyltins	Krone 1988	5
Resin acids	EPA 8270D	10

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes
Case narrative present and complete?	Yes
Any holding time violations?	No

Conventionals Checklist

Any positive method blank results?	No
Laboratory QC frequency of one blank and LCS with each batch and one set of MS and triplicates per 20 samples (if applicable)?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%?	Yes
Triplicate relative standard deviation (RSD) within QC limits of less than 20%?	Yes
LCS percent recovery values within QC criteria of 80-120%?	Yes
Are calibration correlation coefficients > 0.995?	Yes
Are ICV percent recovery values 90-110%?	Yes
Are CCV percent recovery values 90-110% or 85-115% for total sulfides?	Yes

Semivolatile Organic Compound Checklist

Any compounds present in method blanks?	No

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 20, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS27, NT66 and NT67

Semivolatile Organic Compound Checklist

For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, refer to table below. No data qualified because the method allows one surrogate to exceed control limits without qualification.
MS/MSD percent recovery values within laboratory QC criteria?	Yes
MS/MSD relative percent difference values within laboratory QC criteria?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	Yes. Sample SH-22-WS-00 analyzed at 3x dilutions for fluoranthene.
Spot check retention time windows and second column confirmations as complete.	All acceptable

Resin Acids Checklist

Any compounds present in method blanks?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	Yes
MS/MSD percent recovery values within laboratory QC criteria?	Yes
MS/MSD relative percent difference values within laboratory QC criteria?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	No. Abietic acid percent recovery was 282% in the LCS, neoabietic acid percent recoveries were 27 and 5 percent. See table below for qualified results.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	Yes. SH-22-WS-00 analyzed at 3x dilution for two compounds, see table below.

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Resin Acids Checklist

Spot check retention time windows and second column confirmations as complete.	All Acceptable

Tributyltins Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes
Were elements recovered ≤30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	No
Spot check retention time windows and second column confirmations as complete.	Yes

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Recoveries of surrogate 2-fluorobiphenyl were greater than the upper laboratory control limit for several samples, as shown in the table below. No data were qualified because SVOC method 8270D allows one acid or base surrogate to exceed criteria, and all other surrogate recoveries were acceptable.

- Recoveries of surrogate tripropyl tin chloride were greater than the upper laboratory control limit for the MS and MSD analysis of sample SH-01-SS-00. No data were qualified because all other criteria were met.

- The percent recovery for abietic acid (282 percent) in the laboratory control sample, and neoabietic acid in the LCS (27 percent) and LCSD (5 percent) exceeded the control limits. The abietic acid result for sample RF-02-SS was qualified as estimated because this sample had a positive result. The results for neoabietic acid were qualified as estimated at the detection limit (UJ) for samples RF-01-SS-00, RF-02-SS-00, and RF-03-SS-00.

- Sample SH-22-WS-00 was reanalyzed at a 3x dilution because one or more compounds were reported at a concentration greater than the upper calibration range. Fluoranthene, dehydroabietic acid, and abietic acid were reported from a 3x dilution of sample SH-22-WS-00.

Positive Blanks

No blanks reported with positive results.

Samples Qualified for Positive Method Blank Results

No samples qualified for positive method blank results.

Samples with Surrogate Recoveries Outside Laboratory Control Limits

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8270D	LCS	2-fluorobiphenyl	86	39-82	NA	None
8270D	LCSD	2-fluorobiphenyl	86	39-82	NA	None
8270D	SH-01-SS-00	2-fluorobiphenyl	94	32-88	NA	None
8270D	SH-02-SS-00	2-fluorobiphenyl	94	32-88	NA	None
8270D	SH-10-SS-00	2-fluorobiphenyl	92	32-88	NA	None
8270D	SH-26-WS-00 MS	2-fluorobiphenyl	94	32-88	NA	None
Krone	SH-01-SS-00 MS	Tripropyl tin chloride	105	32-104	NA	None
Krone	SH-01-SS-00 MSD	Tripropyl tin chloride	111	32-104	NA	None

Duplicate or Triplicate Results Outside Control Limits

No duplicate or triplicate results outside of control limits

Matrix Spike Recoveries Outside Control Limits

No matrix spike recoveries outside control limits

Laboratory Control Sample Recoveries Outside Control Limits

Method	Sample ID	Compound	LCS % REC	Lab Limits	Qualifier
Resin	RF-02-SS-00	Abietic acid	282	30-160	J
Resin	RF-01-SS-00	Neoabietic acid	27 / 5 (LCSD)	30-160	UJ
Resin	RF-02-SS-00	Neoabietic acid	27 / 5 (LCSD)	30-160	UJ
Resin	RF-02-SS-00	Neoabietic acid	27 / 5 (LCSD)	30-160	UJ

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

Sample ID	Compound	Reason for reanalysis
SH-22-WS-00	Fluoranthene	Result exceeded linear range. Reanalyzed at a 3x dilution.
SH-22-WS-00	Dehydroabietic acid	Result exceeded linear range. Reanalyzed at a 3x dilution.
SH-22-WS-00	Abietic acid	Result exceeded linear range. Reanalyzed at a 3x dilution.

Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

No samples qualified for confirmation column percent difference values outside control limits.

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
UJ	Analyte was not detected at or above the reported estimate.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: December 4, 2008	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NV03

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project Sampling and Analysis Plan (SAP) (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the following tables and checklists. Any major or minor concern affecting data usability is summarized below. Checklists and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples Reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
SH-13-SC-12	10/15/08 ; 09:00	Sediment	Total solids, grain size, TOC, ammonia, sulfides, SVOCs
HI-02-SC-12	10/15/08 ; 10:30	Sediment	Total solids, grain size, TOC, ammonia, sulfides
SH-04-SC-12	10/15/08 ; 11:40	Sediment	Total solids, grain size, TOC, ammonia, sulfides, SVOCs
SH-05-SC-12	10/15/08 ; 13:10	Sediment	Total solids, grain size, TOC, ammonia, sulfides, SVOCs
SH-07-SC-12	10/15/08 ; 14:00	Sediment	Total solids, grain size, TOC, ammonia, sulfides, SVOCs

Analytical Methods

Analysis	Analytical Method	Number of Samples
Total solids	EPA method 160.3	5
Grain size	PSEP	5
TOC	Plumb, 1981	5
Ammonia	EPA method 350.1	5
Total sulfides	EPA method 376.2	5
Semivolatile organic compounds	EPA method 8270D	4

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 degrees C and in good condition as indicated on COC and Cooler Receipt Form?	Yes
Frequency of QC samples correct? (MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.)	Yes.
Case narrative present and complete?	Yes
Any holding time violations?	No

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: December 4, 2008	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NV03

Conventionals Checklist

Any positive method blank results?	No
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD and triplicates per 20 samples (if applicable)?	Yes. MS for TOC and sulfide; triplicate analysis for total solids, grain size, and TOC; duplicate analysis for sulfide.
MS/MSD percent recovery values within QC criteria of 75-125% (65 to 130 percent for sulfides) (see Table 6)?	No. Sulfide MS percent recovery was 64%. Sulfide LCS okay, so no data qualified.
Triplicate relative standard deviation (RSD) within QC limits of less than 20%?	Yes – percent RSD ranged from 1 to 5 for all grain size fractions.
LCS percent recovery values within QC criteria of 80-120%?	Yes
Are calibration correlation coefficients > 0.995?	Yes
Are ICV percent recovery values 90-110%?	Yes
Are CCV percent recovery values 90-110% or 85-115% for total sulfides?	Yes

Semivolatile Organics Checklist

Any compounds present in method, trip, and field blanks?	Yes. Bis (2-ethylhexyl) phthalate detected in method blank above MDL but less than the RL.
For samples, if results are <5 times the blank or < 10 times blank for common laboratory contaminants then "U" flag data. Qualification also applies to TICs.	All samples below RL except SH-04-SC-12. See table below.
Laboratory QC frequency of one method blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes. MS/MSD results not reported with these five samples.
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	Yes
MS/MSD percent recovery values within laboratory QC criteria?	Not Applicable.
MS/MSD relative percent difference values within laboratory QC criteria%?	Not Applicable.
LCS percent recovery values within Laboratory QC criteria?	Yes
Do internal standards areas and retention time meet criteria? If no, was sample re-analyzed to establish matrix?	No. Chrysene-d12 exceeded upper limit for sample SH-04-SC-12. Sample diluted 3X and re-analyzed with acceptable IS area. Associated compounds below RL reported from original analysis; associated detected compounds reported from dilution.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Do continuing calibration %D values meet criteria?	Yes
Were any samples re-analyzed or diluted? For any sample re-analysis and dilutions is only one reportable result by flagged?	Yes. Sample SH-04-SC-12 diluted due to internal standard failure. See table below for compounds reported from dilution.

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Matrix spike recovery (64 percent) of sulfide for sample SH-07-SC-12 was below criteria (65 to 130 percent). No data were qualified because the exceedance was minor (1 percent) and all other criteria were met.

- Bis (2-ethylhexyl) phthalate (BEHP) was detected in the method blank. With the exception of sample SH-04-SC-12, BEHP was not detected above the reporting limit in any samples. The reported result of BEHP for sample SH-04-SC-12 was qualified as estimated because the value was less than 10 times the method blank contamination.

- Percent recovery for internal standard compound chrysene-d_{12} exceeded 150 percent for sample SH-04-SC-12; the sample was re-analyzed at a 3 times dilution with acceptable results. For the original analysis, all associated compounds were not detected above the reporting limit with the exception of pyrene, benzo (a) anthracene, bis (2-ethylhexyl) phthalate, chrysene. These compounds were reported from dilution analysis of sample SH-04-SC-12 (see table below).

Positive Blanks

Method	Sample ID	Blank Type	Compound	Result	Flag	Units	RL
8270D	MB-102203	Method	Bis(2-ethylhexyl) phthalate	0.14	J	ug/kg	20

Samples Qualified for Positive Method Blank Results

Method	Sample ID	Compound	Result	Units	Qualifier
8270D	SH-04-SC-12	Bis(2-ethylhexyl) phthalate	110	ug/kg	J

Surrogate Recoveries Outside Control Limits

- No results outside control limits.

Duplicate or Triplicate Results Outside Control Limits

- No results outside control limits.

Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Type	Compound	% Rec	Limits	Qualifier
EPA 376-2	SH-07-SC-12	MS	Sulfide	64	65 – 130	None

Laboratory Control Sample Recoveries Outside Control Limits

- No results outside control limits.

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

Sample ID	Compound	Reason for Reanalysis
SH-04-SC-12	Pyrene	Internal standard area outside criteria in undiluted sample
SH-04-SC-12	Benzo (a) anthracene	Internal standard area outside criteria in undiluted sample
SH-04-SC-12	Bis (2-ethylhexyl) phthalate	Internal standard area outside criteria in undiluted sample
SH-04-SC-12	Chrysene	Internal standard area outside criteria in undiluted sample

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
U	Analyte was not detected at or above the reported result.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 22, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS78,79,80, NU81 and NV08

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 22, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS78,79,80, NU81 and NV08

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
SH-05-SS-00	10/01/08 ; 09:11	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-04-SS-00	10/01/08 ; 09:50	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-03-SS-00	10/01/08 ; 10:20	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-09-SS-00	10/01/08 ; 11:21	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-21-WS-00	10/01/08 ; 11:45	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-20-WS-00	10/01/08 ; 12:28	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-19-WS-00	10/01/08 ; 12:52	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-24-WS-00	10/01/08 ; 13:32	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-15-SS-00	10/01/08 ; 15:44	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-29-WS-00	10/01/08 ; 16:19	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-16-SS-00	10/01/08 ; 16:54	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-30-WS-00	10/01/08 ; 17:15	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, TBT, resin acids
SH-15-SC-12	10/01/08 ; 16:20	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-01-SC-12	10/01/08 ; 12:35	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs, TBT
OB-01-SS-00	10/02/08 ; 15:23	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-03-SS-00	10/02/08 ; 16:10	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-21-WC-12	10/02/08 ; 09:50	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-16-SC-12	10/02/08 ; 12:00	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-30-WC-12	10/02/08 ; 13:30	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, TBT, resin acids
SH-09-SC-12	10/01/08 ; 18:00	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
HI-07-SS-00	10/02/08 ; 08:48	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-12-SS-00	10/02/08 ; 09:40	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-11-SS-00	10/02/08 ; 10:32	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-18-WS-00	10/02/08 ; 11:15	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
SH-25-WS-00	10/02/08 ; 12:05	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
HI-05-SS-00	10/02/08 ; 13:24	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
OB-02-SS-00	10/02/08 ; 14:30	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-12-SC-12	10/02/08 ; 15:30	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-18-WC-12	10/02/08 ; 16:30	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 22, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS78,79,80, NU81 and NV08

SH-11-SC-12	10/14/08 ; 12:00	Sediment	Grain size, TOC, ammonia, sulfides, SVOCs
SH-19-WC-12	10/14/08 ; 13:45	Sediment	Grain size, TOC, TVS, ammonia, sulfides, SVOCs, resin acids
HI-03-SC-12	10/14/08 ; 15:40	Sediment	Grain size, TOC, ammonia, sulfides
HI-04-SC-12	10/14/08 ; 16:50	Sediment	Grain size, TOC, ammonia, sulfides
OB-07-SC-12	10/16/08 ; 08:00	Sediment	Grain size, TOC, ammonia, sulfides
OB-08-SC-12	10/16/08 ; 10:15	Sediment	Grain size, TOC, ammonia, sulfides
HI-01-SC-12	10/16/08 ; 17:00	Sediment	Grain size, TOC, ammonia, sulfides

Analytical methods

Analysis	Analytical Method	Number of Samples
Grain size	PSEP	36
TOC	Plumb, 1981	36
TVS	EPA 160.4	12
Ammonia	EPA 350.1	36
Total sulfides	EPA 376.2	36
SVOCs	EPA 8270D	31
Tributyltins	Krone 1988	3
Resin acids	EPA 8270D	12

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	No. Three of eight coolers for NS78,79, 80 arrived at 7.0 to 7.6 degrees. No data flagged.
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes
Case narrative present and complete?	Yes
Any holding time violations?	No

Conventionals Checklist

Any positive method blank results?	No
Laboratory QC frequency of one blank and LCS with each batch and one set of MS and triplicates per 20 samples (if applicable)?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%?	Yes
Triplicate relative standard deviation (RSD) within QC limits of less than 20%?	Yes

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 22, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS78,79,80, NU81 and NV08

Conventionals Checklist

LCS percent recovery values within QC criteria of 80-120%?	Yes
Are calibration correlation coefficients > 0.995?	Yes
Are ICV percent recovery values 90-110%?	Yes
Are CCV percent recovery values 90-110% or 85-115% for total sulfides?	Yes

Semivolatile Organic Compound Checklist

Any compounds present in method blanks?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, refer to table below.
MS/MSD percent recovery values within laboratory QC criteria?	Yes
MS/MSD relative percent difference values within laboratory QC criteria?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	Yes. See table below.
Spot check retention time windows and second column confirmations as complete.	All acceptable

Resin Acids Checklist

Any compounds present in method blanks?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
Surrogate recovery values for method blanks and LCS/LCSD samples within laboratory QC limits?	Yes
Surrogate recovery values for samples within laboratory QC limits?	Yes
MS/MSD percent recovery values within laboratory QC criteria?	Yes

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 22, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS78,79,80, NU81 and NV08

Resin Acids Checklist

MS/MSD relative percent difference values within laboratory QC criteria?	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	No. See table below.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	Yes. See table below.
Spot check retention time windows and second column confirmations as complete.	Internal standard failed low in sample SH-21-WC-12. See table below.

Tributyltins Checklist

Any compounds present in method blank?	No
For samples, if results are <5 times the blank then "U" flag data.	
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD per 20 samples?	Yes
MS/MSD percent recovery values within QC criteria of 75-125%? QC limits are not applicable to sample results greater than 4 times spike amount.	Yes
Were elements recovered ≤30%? If so, "REJ" flag associated NDs on Form 1's.	No
Sample and duplicate relative percent difference values within QC criteria of <20%? Apply criteria only when both results are >PQL.	Yes
LCS percent recovery values within laboratory QC criteria? If the value is high with no positive values in the associated data; then no data qualification is required.	Yes
Surrogate recovery values for samples within laboratory QC limits?	No, see table below.
Is initial calibration for target compounds <20 % RSD or curve fit?	Yes
Is continuing calibration for target compounds < 20%?	Yes
Were any samples re-analyzed or diluted? For any sample re-analyzed of diluted is only one result reported?	No
Spot check retention time windows and second column confirmations as complete.	Yes

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Three of the 8 coolers for work orders NS78, 79, and 80 were received at 7.0 to 7.6 deg C. Minor exceedance, no data qualified

- Bis(2-ethylhexl)phthalate (BEHP) was detected in one of the method blanks at a concentration greater than the reporting limit. Only samples with positive results less than 10 times the blank contamination were qualified. Seven samples, as shown in the table below, had a positive result for (BEHP) that was less than 10 times the method blank result. These samples were qualified as not detected (U) at the reported result.

- Recoveries of one surrogate for several samples were outside of laboratory or EPA control limits, as shown in the table below. No data were qualified because SVOC method 8270D allows one acid or base surrogate to exceed criteria, and all other surrogate recoveries were acceptable.

- The percent recovery for surrogate o-methyl podocarpic arid (141 percent) was greater than the upper laboratory control limit (114 percent) for sample SH-21-WC-12. Not detected values were not qualified because the failure was high. Detected compound were qualified as estimated (J).

- The percent recovery values for three matrix spike analyses for sulfides were below the method control limits (75 to 125 percent). Because all other QC data were within control for the sulfides analyses, no data except the original sample were qualified. As shown in the table below, sample SH-21-WS-00 was qualified as estimated (J) and sample HI-01-SC-12 was qualified as estimated at the detection limit (UJ). Sample SH-11-SC-12 was not qualified because the matrix spike recovery failure was marginal (1 percent) and all other QC criteria were met.

- The percent recovery for neoabietic acid in two LCS (20 and 9 percent) and two LCSD (9 and 22 percent) samples exceeded the control limits. Results for neoabietic acid were qualified as estimated at the detection limit (UJ) or estimated (J) for 13 samples, as shown in the table below.

- The percent recovery for internal standard d12-perylene (42 percent) in the analysis of sample SH-21-WC-12 fell below method control limits (50 to 150 percent). The compounds associated with internal standard d12-perylene were qualified as estimated at the detection limit in sample

SH-21-WC-12, as shown in the table below.

- Samples SH-18-WC-12 and SH-21-WC-12 were reanalyzed at a 10x, 20x, or 50x dilution because one or more compounds were reported at a concentration greater than the upper calibration range, as shown in the table below.

Positive Blanks

Method	Sample ID	Blank Type	Compound	Result	Flag	Units	RL
8270D	MB-101408	Method	bis(2-Ethylhexyl)phthalate	80		ug/L	20

Samples Qualified for Positive Method Blank Results

Method	Sample ID	Compound	Result	Units	Qualifier
8270D	SH-05-SS-00	bis(2-Ethylhexyl)phthalate	49	ug/L	U
8270D	SH-04-SS-00	bis(2-Ethylhexyl)phthalate	55	ug/L	U
8270D	SH-03-SS-00	bis(2-Ethylhexyl)phthalate	60	ug/L	U
8270D	SH-20-WS-00	bis(2-Ethylhexyl)phthalate	23	ug/L	U
8270D	SH-19-WS-00	bis(2-Ethylhexyl)phthalate	35	ug/L	U
8270D	SH-30-WS-00	bis(2-Ethylhexyl)phthalate	21	ug/L	U
8270D	SH-12-SC-12	bis(2-Ethylhexyl)phthalate	73	ug/L	U

Samples with Surrogate Recoveries Outside Laboratory Control Limits

Method	Sample ID	Compound	% Rec	Lab Limits	EPA Limits	Qualifier
8270D	SH-05-SS-00	d4-2-Chlorophenol	89	30-84	13-101	None
8270D	SH-03-SS-00	d4-2-Chlorophenol	87	30-84	13-101	None
8270D	SH-20-WS-00	d5-Nitrobenzene	22	29-87	16-103	None
8270D	SH-20-WS-00	d4-1,2-Dichlorobenzene	17	25-82	NA	None
8270D	SH-12-SC-12	d14-p-Terphenyl	100	21-97	NA	None
8270D	SH-16-SC-12	d14-p-Terphenyl	99	21-97	NA	None
8270D	SH-30-WC-12	d14-p-Terphenyl	100	21-97	NA	None
8270D	HI-07-SS-00	d14-p-Terphenyl	103	21-97	NA	None
Resin	SH-21-WC-12	o-Methyl podocarpic acid	141	19-114	NA	J or none

Duplicate or Triplicate Results Outside Control Limits

No duplicate or triplicate results outside of control limits

Matrix Spike Recoveries Outside Control Limits

Method	Sample ID	Compound	MS % Rec	MSD %Rec	Limits	Qualifier
EPA 376.2	SH-21-WS-00	Sulfide	43	NA	75-125	J
EPA 376.2	SH-11-SC-12	Sulfide	74	NA	75-125	None
EPA 376.2	HI-01-SC-12	Sulfide	59	NA	75-125	UJ

Laboratory Control Sample Recoveries Outside Control Limits

Method	Sample ID	Compound	LCS % REC	Lab Limits	Qualifier
Resin	SH-21-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-20-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-19-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-24-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-29-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-30-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-01-SC-12	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-21-WC-12	Neoabietic acid	20 / 9 (LCSD)	30-160	J
Resin	SH-30-WC-12	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-18-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-25-WS-00	Neoabietic acid	20 / 9 (LCSD)	30-160	UJ
Resin	SH-18-WC-12	Neoabietic acid	20 / 9 (LCSD)	30-160	J
Resin	SH-19-WC-12	Neoabietic acid	9 / 22 (LCSD)	30-160	UJ

Samples Qualified for Internal Standard Recoveries Outside Control Limits

Method	Sample ID	Compound	IS % REC	Lab Limits	Qualifier
Resin	SH-21-WC-12	14-Chlorodehydroabietic acid	42	50-150	UJ
Resin	SH-21-WC-12	12-Chlorodehydroabietic acid	42	50-150	UJ
Resin	SH-21-WC-12	Dichlorodehydroabietic acid	42	50-150	UJ
Resin	SH-21-WC-12	9,10-Dichlorostearic acid	42	50-150	UJ

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: January 22, 2009	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NS78,79,80, NU81 and NV08

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

Sample ID	Compound	Reason for reanalysis
SH-18-WC-12	Retene	Result exceeded linear range. Reanalyzed at a 10x dilution.
SH-21-WC-12	Dehydroabietic acid	Result exceeded linear range. Reanalyzed at a 20x dilution.
SH-21-WC-12	Abietic acid	Result exceeded linear range. Reanalyzed at a 20x dilution.
SH-18-WC-12	Dehydroabietic acid	Result exceeded linear range. Reanalyzed at a 50x dilution.
SH-18-WC-12	Abietic acid	Result exceeded linear range. Reanalyzed at a 50x dilution.

Samples Qualified for Confirmation Column Percent Difference Values Outside Control Limit.

No samples qualified for confirmation column percent difference values outside control limits.

Data Qualification Code Definitions

Code	Description
J	Analyte was positively identified. The reported result is an estimate.
UJ	Analyte was not detected at or above the reported estimate.

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: December 4, 2008	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NW66

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per Washington Department of Ecology (Ecology) Quality Assurance Review Guidance for the quality assurance review level 1 review (QA1) of sediments (PTI, 1989). Specific criteria for QC limits were obtained from the project SAP (Herrera 2008) and Ecology's Sediment Sampling and Analysis Plan Appendix (Ecology 2008). Compliance with the project QA program is indicated in the checklist and tables. Any major or minor concern affecting data usability is summarized below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Samples reviewed

Sample ID	Date/Time Collected	Matrix	Analyses
SH-23-WS-00	9/30/08 ; 15:43	Sediment	Grain size
SH-04-SS-00	10/1/08 ; 09:50	Sediment	Grain size
SH-03-SS-00	10/1/08 ; 10:20	Sediment	Grain size
SH-19-WS-00	10/1/08 ; 12:52	Sediment	Grain size
OB-3-SS-00	10/2/08 ; 16:10	Sediment	Grain size
SH-12-SS-00	10/2/08 ; 09:40	Sediment	Grain size
SH-11-SS-00	10/2/08 ; 10:32	Sediment	Grain size
SH-25-WS-00	10/2/08 ; 12:05	Sediment	Grain size
OB-13-SS-00	10/4/08 ; 11:24	Sediment	Grain size
SH-13-SS-00	10/5/08 ; 13:21	Sediment	Grain size

Analytical methods

Analysis	Analytical Method	Number of Samples
Grain size	PSEP	10

General Sample Information Checklist

All samples/analyses on COC reported?	Yes
Did coolers arrive at lab between 2 and 6 deg C and in good condition as indicated on COC and Cooler Receipt Form?	No. Six or the 23 coolers received at 7 deg C and two of the 23 coolers received at 8 deg C. Minor exceedance, no data qualified.
Frequency of QC samples correct? MS/MSD, duplicate, or triplicate samples – 1/20 samples, if requested.	Yes. Batch sample analyzed in triplicate with project samples.
Case narrative present and complete?	Yes
Any holding time violations?	No

Quality Assurance Review Level 1 Report	Project: Ecology – Oakland Bay
Date Completed: December 4, 2008	Review Completed by: Gina Catarra
Laboratory: Analytical Resources, Inc.	Laboratory Work Order : NW66

Conventionals Checklist

Any positive method blank results?	Not Applicable
Laboratory QC frequency of one blank and LCS with each batch and one set of MS/MSD and triplicates per 20 samples (if applicable)?	Yes – triplicate analysis performed.
MS/MSD percent recovery values within QC criteria of 75-125%?	Not Applicable
Triplicate relative standard deviation (RSD) within QC limits of less than 20%?	Yes – percent RSD ranged from 1 to 5 for all grain size fractions.
LCS percent recovery values within QC criteria of 80-120%?	Not Applicable.
Are calibration correlation coefficients > 0.995?	Not Applicable.
Are ICV percent recovery values 90-110%?	Not Applicable.
Are CCV percent recovery values 90-110% or 85-115% for total sulfides?	Not Applicable.

Summary of Potential Impacts on Data Usability

Major Concerns

- None

Minor Concerns

- Six or the 23 coolers received at 7 deg C and two of the 23 coolers received at 8 deg C. Minor exceedance, no data qualified.

Duplicate or Triplicate Results Outside Control Limits

- No results outside control limits.

Compounds Reported from Reanalysis or Dilution Due to Quality Issues

- No reanalysis or dilutions required.

Data Qualification Code Definitions

Code	Description
U	Analyte was not detected at or above the reported result.