

## Data Validation Report

Project:	Portland Harbor
Laboratory:	Alpha Analytical Laboratory
Environmental Test Record (ETR):	1510020
Analyses/Method:	Polycyclic Aromatic Hydrocarbons (PAH), n-Alkanes and Total Petroleum Hydrocarbons (TPH), and Total Organic Carbon (TOC)

### Summary

Twenty sediment samples were collected in Portland Harbor, Oregon between October 21, 2015 and October 23, 2015. Samples were analyzed for polycyclic aromatic hydrocarbons (PAH) by EPA Method 8270D modified by selected ion monitoring mode (SIM), n-alkanes and total petroleum hydrocarbons (TPH) by EPA Method 8015D, and total organic carbon (TOC) by EPA Method 9060A by Alpha Analytical Laboratory located in Mansfield, Massachusetts. The laboratory provided Level 4 data packages containing samples results and associated quality assurance (QA) and quality control (QC) data, preparation logs, and raw instrument output. The following sediment samples are associated with the laboratory ETR 1510020.

Sample ID	Lab ID	Matrix
PH15-34-A	1510020-01	Sediment
PH15-35-A	1510020-02	Sediment
PH15-42-A	1510020-03	Sediment
PH15-46-A	1510020-04	Sediment
PH15-47-A	1510020-05	Sediment
PH15-48-A	1510020-06	Sediment
PH15-49-A	1510020-07	Sediment
PH15-09-A	1510020-08	Sediment
PH15-09-C	1510020-09	Sediment
PH15-09-D	1510020-10	Sediment
PH15-28-A	1510020-11	Sediment
PH15-28-C	1510020-12	Sediment
PH15-28-D	1510020-13	Sediment
PH15-29-D	1510020-14	Sediment
PH15-30-A	1510020-15	Sediment
PH15-30-C	1510020-16	Sediment
PH15-30-D	1510020-17	Sediment
PH15-31-A	1510020-18	Sediment
PH15-31-C	1510020-19	Sediment
PH15-31-D	1510020-20	Sediment

The data have been independently validated using *USEPA Contact Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review* EPA-540-R-2017-002, dated January 2017. Validation includes reconstruction of the analytical data to verify that data are traceable and



sufficiently complete in order for a qualified individual other than the originator to perform reconstruction of the data. The validation included the following checks:

- Sample Receipt/Transcription error check
- Sample preservation
- Sample holding times
- Tune Summary
- Initial calibration
- Continuing calibration verification (CCV)
- Laboratory blank contamination
- Equipment blank contamination
- Surrogate spike recoveries
- Internal Standard recoveries
- Matrix spike/Matrix spike duplicate (MS/MSD) recoveries, relative percent difference (RPD)
- Standard Reference Material Sediment accuracy check
- Laboratory control sample (LCS), LCS Duplicate (LCSD) recoveries, RPD values
- Calculation checks
- Contract Required Quantitation Limit (CRQL)
- Field duplicate results
- Laboratory duplicate results
- Overall assessment of the data

Data validation is based on the QC criteria documented in *Portland Harbor Supplemental Sediment Study, Portland Oregon Quality Assurance Project Plan (QAPP)*,<sup>1</sup> dated October 14, 2015, and the *Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling Quality Assurance Project Plan (QAPP)*,<sup>2</sup> dated March 23, 2018. Data qualifiers assigned to results reported in this sample set are included in Table 1. Reason codes and explanations for qualified data are provided in Table 2.

### **Sample Receipt**

Chain of custody documentation were reviewed for completeness of information relevant to the samples and requested analysis. Sample IDs and sample collection dates from the chain of custody records were matched to the reported data. No discrepancies noted.

All coolers were received within  $4 \pm 2^\circ\text{C}$ .

### **ORGANIC ANALYSES**

#### **Holding Time and Sample Preservation**

All samples were extracted and analyzed within holding times.

#### **GC/MS Instrument Performance Check – Acceptable**

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<sup>1</sup> NewFields. (2015). Portland Harbor Supplemental Sediment Study, Portland Oregon Quality Assurance Project Plan (QAPP). October 14, 2015.

<sup>2</sup> AECOM and Geosyntec. 2018. Portland Harbor Pre-Remedial Design Investigation and Baseline Sampling Portland Harbor Superfund Site, Quality Assurance Project Plan. March 23, 2018,



## Initial Calibration and Continuing Calibration Verifications – Acceptable

**Blanks** – Acceptable except as noted below:

Method Blank: The method blank met the QC acceptance criteria for PAH. PAH were detected in the method blank below the reporting limit. However, with the exception of the analytes below, the associated sample results were either non-detect or were greater than 10X the blank concentration. Samples containing the below listed analytes at concentrations below the reporting limit were qualified as not detected, and were flagged “U” at the reporting limit based on the method blank result.

PAH Compounds	Result	Unit	Lab Qualifier
cis/trans-Decalin	0.0702	µg/Kg	J
Naphthalene	0.0593	µg/Kg	J
Biphenyl	0.0765	µg/Kg	J
Fluoranthene	0.0637	µg/Kg	J
Pyrene	0.0771	µg/Kg	J
Benzo[g,h,i]perylene	0.0482	µg/Kg	J

The method blank met the QC acceptance criteria for n-alkanes and TPH. n-Alkanes were detected in the method blank below the reporting limit. However, with the exception of the analytes below, the associated sample results were either non-detect or were greater than 10X the blank concentration. Samples containing the below listed analytes at concentrations below the reporting limit were qualified as not detected, and were flagged “U” at the reporting limit based on the method blank result.

n-Alkanes and TPH Compounds	Result	Unit	Lab Qualifier
n-Decane (C10)	0.00147	mg/Kg	J
n-Docosane (C22)	0.000400	mg/Kg	J
n-Pentacosane (C25)	0.0323	mg/Kg	CJ
n-Hexacosane (C26)	0.000733	mg/Kg	J
n-Heptacosane (C27)	0.000800	mg/Kg	J
n-Hentriacontane (C31)	0.000667	mg/Kg	J

Rinsate Blank: Three rinsate blanks were collected on October 23, 2015, October 26, and October 27, 2015 (PH15-03-RB, PH15-04-RB, PH15-05-RB, respectively [ETR 1510012 and ETR 150019]) and are associated with the samples in this ETR.

- PH15-03-RB is associated with: PH15-01-A, PH15-03-A, PH15-06-A, PH15-06-B, PH15-07-A, PH15-07-B, PH15-07-C, PH15-08-A, and PH15-08-B.
- PH15-04-RB is associated with: PH15-14-A, PH15-14-A-FD, PH15-15-A, PH15-17-A, PH15-18-A, PH15-20-A, PH15-21-A, PH15-23-A, and PH15-25-A.
- PH15-05-RB is associated with: PH15-13-A and PH15-13-D.

Detections of target compounds in rinsate blanks were evaluated relative to sediment method detection limits (MDL). No target analytes were found in rinsate blanks at relative concentrations at, or above, the sediment MDL. No data were qualified based on the rinsate blank results.



**Surrogate Spikes** – Acceptable.

**Internal Standard Areas** – Acceptable.

**Laboratory Control Samples** – Acceptable.

**Matrix Spike/Spike Duplicate** – Acceptable except as noted below:

The following percent recoveries were outside QC limits:

Sample ID	Analyte	MS (%)	MSD (%)	QC Limit (%)	RPD (%)	QC Limit (%)
PH15-35-A	Naphthalene	ok	320	50 - 125	80	30
	Acenaphthylene	238	715	50 - 125	71	30
	Acenaphthene	ok	211	50 - 125	63	30
	Fluorene	ok	130	50 - 125	ok	30
	Anthracene	138	491	50 - 125	72	30
	Phenanthrene	ok	180	50 - 125	47	30
	Fluoranthene	498	4246	50 - 125	132	30
	Benz[a]anthracene	400	2826	50 - 125	121	30
	Benzo[j]fluoranthene/Benzo[k]fluoranthene	391	2251	50 - 125	106	30
	Dibenz[ah]anthracene/Dibenz[ac]anthracene	204	575	50 - 125	71	30
	n-Nonane (C9)	48	ok	50 - 125	ok	30
	n-Hexadecane (C16)	ok	ok	50 - 125	31	30
	n-Octacosane (C28)	130	ok	50 - 125	36	30
	n-Triacontane (C30)	132	ok	50 - 125	35	30

The results for analytes listed above in the native sample were qualified as estimated and flagged “J” based on these MS/MSD results.

The samples contained highly elevated PAHs indicative tar-derived residues. Heterogeneity of sample matrix expected and reconciles with QC exceedance. The precision and accuracy of the method was demonstrated by the results of the LCS/LCSD. In addition, a PAH standard reference material (SRM 1941b), was reported with this ETR and met the QC acceptance criteria. The results of the SRM demonstrate accuracy has been achieved for this ETR.

**Standard Reference Material** – Acceptable.

**Field Duplicate**– There were no field duplicates associated with this ETR. The precision of the method was demonstrated by the results of the LCS/LCSD.

**Laboratory Duplicate**– Acceptable except as noted below:

Sample ID	Analytes	RPD (%)	QC Limit (%)
PH15-34-A	n-Eicosane (C20)	123	30
	n-Pentacosane (C25)	60	30
	n-Octacosane (C28)	48	30
	n-Nonacosane (C29)	36	30



Sample ID	Analytes	RPD (%)	QC Limit (%)
	n-Tritriacontane (C33)	51	30
	n-Pentatriacontane (C35)	117	30
	n-Heptatriacontane (C37)	94	30
	Total Saturated Hydrocarbons	89	30
	Total Petroleum Hydrocarbons (C9-C44)	89	30

With the exception of 2-methylphenanthrene, all of the PAH results for the laboratory duplicates exceeded the QC limit of 30%. The samples contained elevated PAHs indicative tar-derived residues. Heterogeneity of sample matrix expected and reconciles with QC exceedance. The precision of the method was demonstrated by the results of the LCS/LCSD. The results for the analytes were qualified as estimated and flagged “J” based on elevated laboratory duplicates.

**Target Compound Identifications**– Acceptable.

**Compound Quantitation and CRQLs** – Acceptable.

### CONVENTIONAL ANALYSES

**Holding Time and Sample Preservation** – Acceptable.

**Initial Calibration and Continuing Calibration Verifications** – Acceptable.

**Blanks**– Acceptable.

**Matrix Spike**– Acceptable.

**Standard Reference Material** – Acceptable.

**Field Duplicate**– Acceptable.

**Laboratory Duplicate**– Acceptable.

**Compound Quantitation and CRQLs** – Acceptable

### OVERALL ASSESSMENT OF DATA

The data reported in this laboratory ETR is considered usable for meeting the project objectives.

The completeness is calculated by the number of usable data points divided by the total number of data points generated, multiplied by 100. The completeness for the laboratory ETR is 100%.

### Validation performed by and Date:

George Desreuisseau, Mike Mitchel and Kerylynn Krahforst, December 2018.

Staff Scientists - NewFields

Table 1. QA/QC Summary Review

Sdg	SoilSampID	Lab_ID	AnalMeth	Analyte	Result	Lab_Flag	Units	NFG Result	NFG Qualifier	validator_reason_code
1510020	PH15-09-D	1510020-10	EPA 8270D	Biphenyl	0.264	JB	µg/Kg	0.9166	U	bl
1510020	PH15-28-A	1510020-11	EPA 8270D	Biphenyl	0.617	JB	µg/Kg	0.7456	U	bl
1510020	PH15-28-C	1510020-12	EPA 8270D	Biphenyl	0.143	JB	µg/Kg	0.7292	U	bl
1510020	PH15-28-D	1510020-13	EPA 8270D	Benzo[g,h,i]perylene	0.268	JB	µg/Kg	0.7692	U	bl
1510020	PH15-28-D	1510020-13	EPA 8270D	Biphenyl	0.0648	JB	µg/Kg	0.7692	U	bl
1510020	PH15-28-D	1510020-13	EPA 8270D	Fluoranthene	0.411	JB	µg/Kg	0.7692	U	bl
1510020	PH15-28-D	1510020-13	EPA 8270D	Pyrene	0.49	JB	µg/Kg	0.7692	U	bl
1510020	PH15-29-D	1510020-14	EPA 8270D	Biphenyl	0.591	JB	µg/Kg	0.8682	U	bl
1510020	PH15-30-C	1510020-16	EPA 8270D	Biphenyl	0.106	JB	µg/Kg	0.8796	U	bl
1510020	PH15-30-D	1510020-17	EPA 8270D	Biphenyl	0.0676	JB	µg/Kg	0.8721	U	bl
1510020	PH15-31-C	1510020-19	EPA 8270D	Biphenyl	0.396	JB	µg/Kg	0.8081	U	bl
1510020	PH15-31-D	1510020-20	EPA 8270D	Biphenyl	0.141	JB	µg/Kg	0.8859	U	bl
1510020	PH15-09-D	1510020-10	EPA 8270D	cis/trans-Decalin	0.187	JB	µg/Kg	0.9166	U	bl
1510020	PH15-28-A	1510020-11	EPA 8270D	cis/trans-Decalin	0.161	JB	µg/Kg	0.7456	U	bl
1510020	PH15-28-C	1510020-12	EPA 8270D	cis/trans-Decalin	0.0769	JB	µg/Kg	0.7292	U	bl
1510020	PH15-28-D	1510020-13	EPA 8270D	Naphthalene	0.147	JB	µg/Kg	0.7692	U	bl
1510020	PH15-30-C	1510020-16	EPA 8270D	Naphthalene	0.556	JB	µg/Kg	0.8796	U	bl
1510020	PH15-30-D	1510020-17	EPA 8270D	Naphthalene	0.267	JB	µg/Kg	0.8721	U	bl
1510020	PH15-31-D	1510020-20	EPA 8270D	Naphthalene	0.397	JB	µg/Kg	0.8859	U	bl
1510020	PH15-35-A	1510020-02	EPA 8270D	cis/trans-Decalin	0.573	JB	µg/Kg	0.9038	U	bl
1510020	PH15-42-A	1510020-03	EPA 8270D	cis/trans-Decalin	0.349	JB	µg/Kg	0.8951	U	bl
1510020	PH15-34-A	1510020-01	EPA 8270D	2,6-Dimethylnaphthalene	9.45		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	1-Methyldibenzothiophene	5.75		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	1-Methylnaphthalene	7.13		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Phenanthrene	55.5		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Naphthobenzothiophenes	35.6		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	1-Methylphenanthrene	31.3		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Fluoranthene	1690	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo[j]fluoranthene/Benzo[k]fluoranthene	1220	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo[g,h,i]perylene	1520	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo[e]pyrene	1200	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo[b]fluoranthene	1210	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo[a]pyrene	2050	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Retene	85		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Perylene	613		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Naphthobenzothiophenes	359		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Naphthalene	66.1		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Fluorene	17.3		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Dibenzothiophene	19.7		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Dibenzofuran	3.6		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Dibenz[ah]anthracene/Dibenz[ac]anthracene	328		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	cis/trans-Decalin	1.02	J	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Carbazole	6.68		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Phenanthrenes/Anthracenes	183		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo[a]anthracene	1200	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	2,3,5-Trimethylnaphthalene	3.41		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Pyrene	2580	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Chrysene/Triphenylene	1380	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo[a]fluoranthene	418		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Phenanthrenes/Anthracenes	161		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Naphthobenzothiophenes	182		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Naphthalenes	16.5		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Fluorenes	27.9		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Fluoranthenes/Pyrenes	1030		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Dibenzothiophenes	55.4		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Decalins	5.91		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Chrysenes	800		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C1-Benzo(b)thiophenes	3.16		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Benzo(b)thiophenes	3.57		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo(b)fluorene	5.81		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	3-Methylphenanthrene	14.6		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Benzo(b)fluorene	191		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Anthracene	148		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Acenaphthylene	303		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Acenaphthene	26.6		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	9/4-Methylphenanthrene	58.6		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	4-Methyldibenzothiophene	22.7		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Naphthalenes	87.2		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	2-Methylnaphthalene	19.5		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Indeno[1,2,3-cd]pyrene	1290	D	µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	2/3-Methyldibenzothiophene	21.5		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	Biphenyl	10.2		µg/Kg	J		ld

Sdg	SoilSampID	Lab_ID	AnalMeth	Analyte	Result	Lab_Flag	Units	NFG Result	NFG Qualifier	validator_reason_code
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Dibenzothiophenes	86.3		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	2-Methylanthracene	38		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Chrysenes	442		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Fluoranthenes/Pyrenes	136		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Decalins	27		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Chrysenes	114		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C4-Benzo(b)thiophenes	24.3		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Phenanthrenes/Anthracenes	384		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Naphthobenzothiophenes	84.1		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Naphthalenes	28.9		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Fluorenes	167		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Fluoranthenes/Pyrenes	244		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Fluoranthenes/Pyrenes	462		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Decalins	24.7		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Chrysenes	241		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Benzo(b)thiophenes	10.2		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Phenanthrenes/Anthracenes	455		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Naphthobenzothiophenes	123		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Naphthalenes	15.9		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Fluorenes	130		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Dibenzothiophenes	149		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C2-Decalins	20.6		µg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8270D	C3-Dibenzothiophenes	166		µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Phenanthrenes/Anthracenes	548	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Carbazole	17.4	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	cis/trans-Decalin	1.63	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Dibenz[ah]anthracene/Dibenz[ac]anthracene	1140	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Dibenzofuran	7.75	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Dibenzothiophene	98.7	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Naphthalene	238	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Decalins	122	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Naphthobenzothiophenes	1440	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Fluorene	42.8	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Naphthobenzothiophenes	117	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Naphthalenes	489	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Dibenzothiophenes	267	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Chrysenes	371	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Benzo(b)thiophenes	133	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Phenanthrenes/Anthracenes	1320	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Perylene	1900	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Naphthobenzothiophenes	264	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C4-Fluoranthenes/Pyrenes	417	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Fluoranthene	7000	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Dibenzothiophenes	603	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Pyrene	9520	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Indeno[1,2,3-cd]pyrene	4280	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Phenanthrene	86.7	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Chrysene/Triphenylene	5400	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzo[j]fluoranthene/Benzo[k]fluoranthene	3860	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzo[g,h,i]perylene	4720	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzo[e]pyrene	3820	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzo[b]fluoranthene	4230	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzo[a]pyrene	6710	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benz[a]anthracene	4870	D⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Retene	171	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	3-Methylphenanthrene	20.7	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Benzo(b)thiophenes	10.1	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Biphenyl	32.6	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzothiophene	25.6	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzo[a]fluoranthene	1510	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Benzo(b)fluorene	788	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Anthracene	320	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Acenaphthylene	683	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	Acenaphthene	49.2	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Chrysenes	2780	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	4-Methyldibenzothiophene	148	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	2-Methylanthracene	222	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	2-Methylnaphthalene	68.6	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	2/3-Methyldibenzothiophene	99.7	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	2,3,5-Trimethylnaphthalene	7.63	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	1-Methylphenanthrene	139	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	1-Methylnaphthalene	20	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	1-Methyldibenzothiophene	35.1	⌘	µg/Kg	J		ld

Sdg	SoilSampID	Lab_ID	AnalMeth	Analyte	Result	Lab_Flag	Units	NFG Result	NFG Qualifier	validator_reason_code
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Naphthalenes	95.6	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Fluorenes	686	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	9/4-Methylphenanthrene	222	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Naphthalenes	41.8	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	2,6-Dimethylnaphthalene	25	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Decalins	19.4	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Chrysenes	782	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Benzo(b)thiophenes	38.9	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Phenanthrenes/Anthracenes	1970	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Decalins	108	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C3-Fluoranthenes/Pyrenes	784	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Fluorenes	663	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Fluoranthenes/Pyrenes	1480	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Fluorenes	108	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Decalins	87	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Chrysenes	1490	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Benzo(b)thiophenes	12.5	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Phenanthrenes/Anthracenes	624	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Naphthobenzothiophenes	602	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Naphthalenes	55.5	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Dibenzothiophenes	748	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C2-Naphthobenzothiophenes	386	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Fluoranthenes/Pyrenes	3780	⌘	µg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8270D	C1-Dibenzothiophenes	325	⌘	µg/Kg	J		ld
1510020	PH15-35-A	1510020-02	EPA 8270D	Dibenz[ah]anthracene/Dibenz[ac]anthracene	285		µg/Kg	J		m, md
1510020	PH15-35-A	1510020-02	EPA 8270D	Benzo[j]fluoranthene/Benzo[k]fluoranthene	1030		µg/Kg	J		m, md
1510020	PH15-09-A	1510020-08	EPA 8015M	n-Decane (C10)	0.00327	JB	mg/Kg	0.0838	U	bl
1510020	PH15-09-C	1510020-09	EPA 8015M	n-Decane (C10)	0.00202	JB	mg/Kg	0.088	U	bl
1510020	PH15-09-D	1510020-10	EPA 8015M	n-Decane (C10)	0.00165	JB	mg/Kg	0.0917	U	bl
1510020	PH15-28-A	1510020-11	EPA 8015M	n-Docosane (C22)	0.00298	JB	mg/Kg	0.0746	U	bl
1510020	PH15-28-A	1510020-11	EPA 8015M	n-Decane (C10)	0.00246	JB	mg/Kg	0.0746	U	bl
1510020	PH15-28-C	1510020-12	EPA 8015M	n-Pentacosane (C25)	0.0382	CJB	mg/Kg	0.0729	U	bl
1510020	PH15-28-C	1510020-12	EPA 8015M	n-Decane (C10)	0.00211	JB	mg/Kg	0.0729	U	bl
1510020	PH15-28-C	1510020-12	EPA 8015M	n-Hexacosane (C26)	0.00197	JB	mg/Kg	0.0729	U	bl
1510020	PH15-28-C	1510020-12	EPA 8015M	n-Docosane (C22)	0.00102	JB	mg/Kg	0.0729	U	bl
1510020	PH15-28-D	1510020-13	EPA 8015M	n-Hentriacontane (C31)	0.005	JB	mg/Kg	0.0769	U	bl
1510020	PH15-28-D	1510020-13	EPA 8015M	n-Docosane (C22)	0.000692	JB	mg/Kg	0.0769	U	bl
1510020	PH15-28-D	1510020-13	EPA 8015M	n-Heptacosane (C27)	0.00462	JB	mg/Kg	0.0769	U	bl
1510020	PH15-28-D	1510020-13	EPA 8015M	n-Hexacosane (C26)	0.00131	JB	mg/Kg	0.0769	U	bl
1510020	PH15-28-D	1510020-13	EPA 8015M	n-Pentacosane (C25)	0.0407	CJB	mg/Kg	0.0769	U	bl
1510020	PH15-28-D	1510020-13	EPA 8015M	n-Decane (C10)	0.00138	JB	mg/Kg	0.0769	U	bl
1510020	PH15-29-D	1510020-14	EPA 8015M	n-Heptacosane (C27)	0.00642	JB	mg/Kg	0.0868	U	bl
1510020	PH15-29-D	1510020-14	EPA 8015M	n-Hentriacontane (C31)	0.00564	JB	mg/Kg	0.0868	U	bl
1510020	PH15-29-D	1510020-14	EPA 8015M	n-Hexacosane (C26)	0.000868	JB	mg/Kg	0.0868	U	bl
1510020	PH15-29-D	1510020-14	EPA 8015M	n-Pentacosane (C25)	0.0448	CJB	mg/Kg	0.0868	U	bl
1510020	PH15-29-D	1510020-14	EPA 8015M	n-Decane (C10)	0.00252	JB	mg/Kg	0.0868	U	bl
1510020	PH15-30-A	1510020-15	EPA 8015M	n-Decane (C10)	0.00478	JB	mg/Kg	0.0759	U	bl
1510020	PH15-30-C	1510020-16	EPA 8015M	n-Decane (C10)	0.00158	JB	mg/Kg	0.088	U	bl
1510020	PH15-30-C	1510020-16	EPA 8015M	n-Docosane (C22)	0.000968	JB	mg/Kg	0.088	U	bl
1510020	PH15-30-C	1510020-16	EPA 8015M	n-Heptacosane (C27)	0.0073	JB	mg/Kg	0.088	U	bl
1510020	PH15-30-C	1510020-16	EPA 8015M	n-Hexacosane (C26)	0.00141	JB	mg/Kg	0.088	U	bl
1510020	PH15-30-C	1510020-16	EPA 8015M	n-Pentacosane (C25)	0.0431	CJB	mg/Kg	0.088	U	bl
1510020	PH15-30-D	1510020-17	EPA 8015M	n-Hexacosane (C26)	0.00157	JB	mg/Kg	0.0872	U	bl
1510020	PH15-30-D	1510020-17	EPA 8015M	n-Docosane (C22)	0.00105	JB	mg/Kg	0.0872	U	bl
1510020	PH15-30-D	1510020-17	EPA 8015M	n-Heptacosane (C27)	0.00645	JB	mg/Kg	0.0872	U	bl
1510020	PH15-30-D	1510020-17	EPA 8015M	n-Pentacosane (C25)	0.0485	CJB	mg/Kg	0.0872	U	bl
1510020	PH15-30-D	1510020-17	EPA 8015M	n-Decane (C10)	0.00192	JB	mg/Kg	0.0872	U	bl
1510020	PH15-31-A	1510020-18	EPA 8015M	n-Decane (C10)	0.00422	JB	mg/Kg	0.0728	U	bl
1510020	PH15-31-C	1510020-19	EPA 8015M	n-Decane (C10)	0.0021	JB	mg/Kg	0.0808	U	bl
1510020	PH15-31-C	1510020-19	EPA 8015M	n-Hexacosane (C26)	0.00162	JB	mg/Kg	0.0808	U	bl
1510020	PH15-31-C	1510020-19	EPA 8015M	n-Pentacosane (C25)	0.0443	CJB	mg/Kg	0.0808	U	bl
1510020	PH15-31-D	1510020-20	EPA 8015M	n-Pentacosane (C25)	0.0428	CJB	mg/Kg	0.0886	U	bl
1510020	PH15-31-D	1510020-20	EPA 8015M	n-Hexacosane (C26)	0.00106	JB	mg/Kg	0.0886	U	bl
1510020	PH15-31-D	1510020-20	EPA 8015M	n-Heptacosane (C27)	0.00567	JB	mg/Kg	0.0886	U	bl
1510020	PH15-31-D	1510020-20	EPA 8015M	n-Docosane (C22)	0.000709	JB	mg/Kg	0.0886	U	bl
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Decane (C10)	0.00712	JB	mg/Kg	0.1187	U	bl
1510020	PH15-35-A	1510020-02	EPA 8015M	n-Decane (C10)	0.00615	JB	mg/Kg	0.0904	U	bl
1510020	PH15-42-A	1510020-03	EPA 8015M	n-Decane (C10)	0.00421	JB	mg/Kg	0.0895	U	bl
1510020	PH15-46-A	1510020-04	EPA 8015M	n-Decane (C10)	0.00575	JB	mg/Kg	0.1085	U	bl
1510020	PH15-47-A	1510020-05	EPA 8015M	n-Decane (C10)	0.00681	JB	mg/Kg	0.1048	U	bl
1510020	PH15-48-A	1510020-06	EPA 8015M	n-Decane (C10)	0.00754	JB	mg/Kg	0.1109	U	bl
1510020	PH15-49-A	1510020-07	EPA 8015M	n-Decane (C10)	0.00583	JB	mg/Kg	0.1041	U	bl
1510020	PH15-35-A	1510020-02	EPA 8015M	n-Nonane (C9)	0.00108	J	mg/Kg	J		m



Sdg	SoilSampID	Lab_ID	AnalMeth	Analyte	Result	Lab_Flag	Units	NFG Result	NFG Qualifier	validator_reason_code
1510020	PH15-35-A	1510020-02	EPA 8015M	n-Triacontane (C30)	0.0475	J	mg/Kg	J		m, md
1510020	PH15-35-A	1510020-02	EPA 8015M	n-Hexadecane (C16)	0.00452	J	mg/Kg	J		md
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Eicosane (C20)	0.144		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	Total Saturated Hydrocarbons	7.98		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	Total Petroleum Hydrocarbons (C9-C44)	160		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	Pristane	0.147		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Tritriacontane (C33)	0.484		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Pentatriacontane (C35)	0.213		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Pentacosane (C25)	2.31		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Octacosane (C28)	0.273		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Nonacosane (C29)	0.695		mg/Kg	J		ld
1510020	PH15-34-A	1510020-01	EPA 8015M	n-Heptatriacontane (C37)	0.151		mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	Total Saturated Hydrocarbons	20.8	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	n-Heptatriacontane (C37)	0.42	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	Total Petroleum Hydrocarbons (C9-C44)	418	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	Pristane	0.246	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	n-Tritriacontane (C33)	0.287	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	n-Pentatriacontane (C35)	0.817	G⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	n-Pentacosane (C25)	4.29	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	n-Octacosane (C28)	0.446	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	n-Eicosane (C20)	0.603	⌘	mg/Kg	J		ld
1510020	PH15-34-A-DUP	1510020-01D	EPA 8015M	n-Nonacosane (C29)	1	⌘	mg/Kg	J		ld
1510020	PH15-35-A	1510020-02	EPA 8015M	n-Octacosane (C28)	0.215		mg/Kg	J		m, md

Table 2. Reason Codes and Explanations

Reason Code	Explanation
bf	Field blank contamination
bl	Laboratory blank contamination
C	Calibration issue
el	Clean-up standard recovery
d	Reporting limit raised due to chromatographic interference
fd	Field duplicate RPDs
h	Holding Times
i	Internal standard areas
k	Estimated Maximum Possible Concentration (EMPC)
l	LCS or OPR recoveries
le	Labeled compound recovery
ld	Laboratory duplicate RPDs
lp	Laboratory control sample laboratory control sample duplicate RPDs
m	Matrix spike recovery
md	Matrix spike/matrix spike duplicate RPDs
nb	Negative laboratory blank contamination
p	Chemical preservation issue
r	Dual column RPD
q	Quantitation issue
s	Surrogate recovery
su	Ion suppression
t	Temperature preservation issue
x	Percent solids
y	Serial dilution results
z	ICS results