LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

March 28, 2022

SUBJECT: Port of Bellingham, Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on February 15, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #53482:

SDG #	Fraction
22B0007	Polynuclear Aromatic Hydrocarbons, Polychlorinated Biphenyls as Congeners, Metals, Wet Chemestry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020).
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

Stage 2B EDD

LDC# 53482 (Anchor Environmental - Seattle, WA / Port of Bellingham)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270E)		PCBs (8082A)		(4) Metals (6010D)		TCLP Metals (6010D)		TCLP Hg (7470A)		TOC (9060A)		Total Solids (2540G)																					
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	22B0007	02/15/22	03/09/22	0	9	0	7	0	7	0	2	0	2	0	7	0	7																		
Total	T/CR			0	9	0	7	0	7	0	2	0	2	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

LDC Report# 53482A2a

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: March 24, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0007

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-08SC-0-2-220120	22B0007-13	Sediment	01/20/22
HS-08SC-0-2-220120DL	22B0007-13DL	Sediment	01/20/22
HS-08SC-2-3-220120	22B0007-14	Sediment	01/20/22
FD-20220122	22B0007-37	Sediment	01/22/22
FD-20220122DL	22B0007-37DL	Sediment	01/22/22
HS-07SC-0-2-220122	22B0007-38	Sediment	01/22/22
HS-07SC-2-3-220122	22B0007-39	Sediment	01/22/22
HS-09SC-0-2-220122	22B0007-43	Sediment	01/22/22
HS-09SC-2-3-220122	22B0007-44	Sediment	01/22/22
HS-09SC-0-2-220122MS	22B0007-43MS	Sediment	01/22/22
HS-09SC-0-2-220122MSD	22B0007-43MSD	Sediment	01/22/22
HS-07SC-0-2-220122DL	22B0007-38DL	Sediment	01/22/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270E

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

Instrument performance check was performed at the required frequency.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
02/08/22	Fluoranthene	20.7	HS-08SC-0-2-220120	J (all detects)	A
02/09/22	Fluoranthene	25.8	HS-08SC-0-2-220120DL HS-08SC-2-3-220120 FD-20220122 FD-20220122DL HS-07SC-0-2-220122 HS-07SC-2-3-220122 HS-07SC-0-2-220122DL	J (all detects)	A
02/11/22	Fluoranthene Pyrene	39.7 29.2	HS-09SC-0-2-220122 HS-09SC-2-3-220122	J (all detects) J (all detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

Samples FD-20220122 and HS-07SC-0-2-220122 and samples FD-20220122DL and HS-07SC-0-2-220122DL were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122	HS-07SC-0-2-220122		
Naphthalene	592	620	5 (≤50)	-
2-Methylnaphthalene	144	163	12 (≤50)	-
Acenaphthylene	109	102	7 (≤50)	-
Acenaphthene	229	167	31 (≤50)	-
Fluorene	233	171	31 (≤50)	-
Phenanthrene	1460	719	68 (≤50)	-

Analyte	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122	HS-07SC-0-2-220122		
Anthracene	408	266	42 (≤50)	-
Fluoranthene	2010	855	81 (≤50)	-
Pyrene	4100	2780	38 (≤50)	-
Benzo(a)anthracene	798	456	55 (≤50)	-
Chrysene	1330	978	31 (≤50)	-
Chlorobenzilate	1990	1500	28 (≤50)	-
Benzo(a)pyrene	905	690	27 (≤50)	-
Indeno(1,2,3-cd)pyrene	424	286	39 (≤50)	-
Dibenzo(a,h)anthracene	179	107	50 (≤50)	-
Benzo(g,h,i)perylene	464	308	40 (≤50)	-

Analyte	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122DL	HS-07SC-0-2-220122DL		
Naphthalene	519	557	7 (≤50)	-
2-Methylnaphthalene	117	136	-	19 (≤199.8)
Acenaphthylene	98.8	99.4	-	1 (≤199.8)
Acenaphthene	215	142	-	73 (≤199.8)
Fluorene	199	151	-	48 (≤199.8)
Phenanthrene	1170	626	61 (≤50)	-
Anthracene	353	246	-	107 (≤199.8)
Fluoranthene	1710	832	69 (≤50)	-
Pyrene	3060	2360	26 (≤50)	-
Benzo(a)anthracene	707	426	-	281 (≤199.8)

Analyte	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122DL	HS-07SC-0-2-220122DL		
Chrysene	1060	832	24 (≤50)	-
Chlorobenzilate	1640	1290	24 (≤50)	-
Benzo(a)pyrene	816	601	30 (≤50)	-
Indeno(1,2,3-cd)pyrene	421	300	-	121 (≤199.8)
Dibenzo(a,h)anthracene	125	122	-	3 (≤199.8)
Benzo(g,h,i)perylene	451	329	-	122 (≤199.8)

XI. Internal Standards

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

XII. Target Analyte Quantitation

All target analyte quantitations met validation criteria with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
HS-08SC-0-2-220120	Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzofluoranthenes, total Benzo(a)pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
FD-20220122	Fluoranthene Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A
HS-07SC-0-2-220122	Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
HS-08SC-0-2-220120	Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzofluoranthenes, total Benzo(a)pyrene	Results exceeded calibration range.	Not reportable	-
HS-08SC-0-2-220120DL	All analytes except Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzofluoranthenes, total Benzo(a)pyrene	Results from undiluted analyses were more usable.	Not reportable	-
FD-20220122	Fluoranthene Pyrene	Results exceeded calibration range.	Not reportable	-
FD-20220122DL	All analytes except Fluoranthene Pyrene	Results from undiluted analyses were more usable.	Not reportable	-
HS-07SC-0-2-220122	Pyrene	Results exceeded calibration range.	Not reportable	-
HS-07SC-0-2-220122DL	All analytes except Pyrene	Results from undiluted analyses were more usable.	Not reportable	-

Due to continuing calibration %D, data were qualified as estimated in seven samples.

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 22B0007

Sample	Analyte	Flag	A or P	Reason
HS-08SC-0-2-220120DL HS-08SC-2-3-220120 FD-20220122DL HS-07SC-0-2-220122 HS-07SC-2-3-220122	Fluoranthene	J (all detects)	A	Continuing calibration (%D)
HS-09SC-0-2-220122 HS-09SC-2-3-220122	Fluoranthene Pyrene	J (all detects) J (all detects)	A	Continuing calibration (%D)
HS-08SC-0-2-220120	Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzofluoranthenes, total Benzo(a)pyrene	Not reportable	-	Overall assessment of data
HS-08SC-0-2-220120DL	All analytes except Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzofluoranthenes, total Benzo(a)pyrene	Not reportable	-	Overall assessment of data
FD-20220122	Fluoranthene Pyrene	Not reportable	-	Overall assessment of data
FD-20220122DL	All analytes except Fluoranthene Pyrene	Not reportable	-	Overall assessment of data
HS-07SC-0-2-220122	Pyrene	Not reportable	-	Overall assessment of data
HS-07SC-0-2-220122DL	All analytes except Pyrene	Not reportable	-	Overall assessment of data

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 22B0007

No Sample Data Qualified in this SDG

LDC #: 53482A2a

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 03/16/22

SDG #: 22B0007

Page: 1 of 1

Laboratory: Analytical Resources, Inc., Tukwila, WA

Reviewer: SVG

2nd Reviewer:

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	RSD ≤ 20% ICV ≤ 30%
IV.	Continuing calibration	SW	%D ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS/D
X.	Field duplicates	SW	D = 4/6, 5/12
XI.	Internal standards	A	
XII.	Target analyte quantitation	SW	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	

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

	Client ID	Lab ID	Matrix	Date
1	HS-08SC-0-2-220120	22B0007-13	Sediment	01/20/22
2	HS-08SC-0-2-220120DL	22B0007-13DL	Sediment	01/20/22
3	HS-08SC-2-3-220120	22B0007-14	Sediment	01/20/22
4	FD-20220122 D1	22B0007-37	Sediment	01/22/22
5	FD-20220122DL D2	22B0007-37DL	Sediment	01/22/22
6	HS-07SC-0-2-220122 D1	22B0007-38	Sediment	01/22/22
7	HS-07SC-2-3-220122	22B0007-39	Sediment	01/22/22
8	HS-09SC-0-2-220122	22B0007-43	Sediment	01/22/22
9	HS-09SC-2-3-220122	22B0007-44	Sediment	01/22/22
10	HS-09SC-0-2-220122MS	22B0007-43MS	Sediment	01/22/22
11	HS-09SC-0-2-220122MSD	22B0007-43MSD	Sediment	01/22/22
12	6 DL D2	L-38DL	L	L
13				
14	BKB0082-BLK1			
2	BKB0184-BLK1			

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene (1MDT)	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2. Dibenzo(ah)+(ac)anthracene
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2. Bis(2-ethylhexyl)adipate
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 53482A2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JVG

METHOD: GC/MS BNA (EPA SW 846 Method 8270E)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?
Y (N) N/A Were percent differences (%D) ≤20 % and relative response factors (RRF) within the method criteria?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit)	Associated Samples	Qualifications
	02/08/22	NT102202080202	YY	20.7		1, MB1 (Det)	J/UJ/A
	02/09/22	NT102202090202	YY	25.8		2-7, 12, (Det)	
	02/11/22	NT102202110202	YY	39.7		8, 9, 10, 11, MB2 (Det)	
			ZZ	29.2			

Note: * Ave RRF failed method criteria but within validation criteria

LDC#: 53482A2a

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVG

METHOD: GCMS SVOA (EPA SW 846 Method 8270E)

Compound	Concentration (ug/Kg)		RPD (≤50%)	Difference (ug/Kg)	Limits (±2XRL)
	4	6			
S	592	620	5		
W	144	163	12		
DD	109	102	7		
GG	229	167	31		
NN	233	171	31		
UU	1460	719	68		
VV	408	266	42		
YY	2010	855	81		
ZZ	4100	2780	38		
CCC	798	456	55		
DDD	1330	978	31		
B2	1990	1500	28		
III	905	690	27		
JJJ	424	286	39		
KKK	179	107	50		
LLL	464	308	40		

Compound	Concentration (ug/Kg)		RPD (≤50%)	Difference (ug/Kg)	Limits (±2XRL)
	5	12			
S	519	557	7		
W	117	136		19	≤199.8
DD	98.8	99.4		1	≤199.8
GG	215	142		73	≤199.8
NN	199	151		48	≤199.8
UU	1170	626	61		
VV	353	246		107	≤199.8
YY	1710	832	69		
ZZ	3060	2360	26		
CCC	707	426		281	≤199.8
DDD	1060	832	24		
B2	1640	1290	24		
III	816	601	30		
JJJ	421	300		121	≤199.8
KKK	125	122		3	≤199.8
LLL	451	329		122	≤199.8

V:\Josephine\FIELD DUPLICATES\53482A2a anchor port of bellingham diff.wpd

LDC #: 53482A2a

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported RLs

Page: 1 of 1
Reviewer: JVG

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

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

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Sample ID	Compound	Finding	Qualifications
	1	UU, VV, YY, ZZ, CCC, DDD, BB, III	> cal range	J dets / A
	4	YY, ZZ		
	6	ZZ	✓	✓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 53482A2a

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVG

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.
(Y) ~~N~~ N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Compound	Finding	Qualifications
		1	UU, VV, YY, ZZ, CCC, DDD, B2, III	> cal range	NR
		2	All except above	dil	
		4	YY, ZZ	> cal range	
		5	All except above	dil	
		6	ZZ	> cal range	
		12	All except ZZ	dil	

Comments: _____

LDC Report# 53482A3b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: March 24, 2022

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0007

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-08SC-0-2-220120	22B0007-13	Sediment	01/20/22
HS-08SC-2-3-220120	22B0007-14	Sediment	01/20/22
FD-20220122	22B0007-37	Sediment	01/22/22
HS-07SC-0-2-220122	22B0007-38	Sediment	01/22/22
HS-07SC-2-3-220122	22B0007-39	Sediment	01/22/22
HS-09SC-0-2-220122	22B0007-43	Sediment	01/22/22
HS-09SC-2-3-220122	22B0007-44	Sediment	01/22/22
HS-09SC-0-2-220122MS	22B0007-43MS	Sediment	01/22/22
HS-09SC-0-2-220122MSD	22B0007-43MSD	Sediment	01/22/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples FD-20220122 and HS-07SC-0-2-220122 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122	HS-07SC-0-2-220122		
Aroclor-1254	1550	202	154 (≤50)	-
Aroclor-1260	492	237	70 (≤50)	-

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Polychlorinated Biphenyls as Congeners - Data Qualification Summary - SDG 22B0007

No Sample Data Qualified in this SDG

Port of Bellingham
Polychlorinated Biphenyls as Congeners - Laboratory Blank Data Qualification Summary - SDG 22B0007

No Sample Data Qualified in this SDG

LDC #: 53482A3b
SDG #: 22B0007
Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 03/16/22
Page: 1 of 1
Reviewer: SVG
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/A	RSD ≤ 20%. ICV ≤ 20%
III.	Continuing calibration	A	%D ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	D = 3/4
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII	Overall assessment of data	A	

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

	Client ID		Lab ID	Matrix	Date
1	HS-08SC-0-2-220120		22B0007-13	Sediment	01/20/22
2	HS-08SC-2-3-220120		22B0007-14	Sediment	01/20/22
3	FD-20220122	D	22B0007-37	Sediment	01/22/22
4	HS-07SC-0-2-220122	D	22B0007-38	Sediment	01/22/22
5	HS-07SC-2-3-220122		22B0007-39	Sediment	01/22/22
6	HS-09SC-0-2-220122		22B0007-43	Sediment	01/22/22
7	HS-09SC-2-3-220122		22B0007-44	Sediment	01/22/22
8	HS-09SC-0-2-220122MS		22B0007-43MS	Sediment	01/22/22
9	HS-09SC-0-2-220122MSD		22B0007-43MSD	Sediment	01/22/22
10					
11					
12					
13					

Notes:

	BKB0083-BLK1						

LDC#: 53482A3b

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082)

Compound	Concentration (ug/Kg)		RPD (≤50%)	Difference (ug/Kg)	Limits (±2XRL)
	3	4			
Aroclor 1254	1550	202	154		
Aroclor 1260	492	237	70		

V:\Josephine\FIELD DUPLICATES\53482A3b anchor port of bellingham diff.wpd

LDC Report# 53482A4b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: March 24, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0007

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-08SC-0-2-220120	22B0007-13	Sediment	01/20/22
HS-08SC-2-3-220120	22B0007-14	Sediment	01/20/22
FD-20220122	22B0007-37	Sediment	01/22/22
HS-07SC-0-2-220122	22B0007-38	Sediment	01/22/22
HS-07SC-2-3-220122	22B0007-39	Sediment	01/22/22
HS-09SC-0-2-220122	22B0007-43	Sediment	01/22/22
HS-09SC-2-3-220122	22B0007-44	Sediment	01/22/22
HS-COMP-A-220120(TCLP)	22B0007-18(TCLP)	Sediment	01/20/22
HS-COMP-B-220121(TCLP)	22B0007-36(TCLP)	Sediment	01/21/22
HS-09SC-0-2-220122MS	22B0007-43MS	Sediment	01/22/22
HS-09SC-0-2-220122DUP	22B0007-43DUP	Sediment	01/22/22
HS-COMP-A-220120(TCLP)MS	22B0007-18(TCLP)MS	Sediment	01/20/22
HS-COMP-A-220120(TCLP)DUP	22B0007-18(TCLP)DUP	Sediment	01/20/22

Samples appended with TCLP underwent Toxicity Characteristic Leaching Procedure (TCLP) extraction

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Selenium, Silver, and Zinc by Environmental Protection Agency (EPA) SW 846 Method 6010D
Mercury by EPA SW 846 Methods 7470A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Instrument Calibration

Initial and continuing calibrations were performed as required by the method.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

III. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Barium Mercury	0.0491 mg/L 0.000044 mg/L	HS-COMP-A-220120(TCLP) HS-COMP-B-220121(TCLP)
ICB/CCB	Mercury	0.000043 mg/L	HS-COMP-A-220120(TCLP) HS-COMP-B-220121(TCLP)

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
HS-COMP-A-220120(TCLP)	Barium Mercury	0.0986 mg/L 0.000045 mg/L	0.0986U mg/L 0.000100U mg/L
HS-COMP-B-220121(TCLP)	Barium Mercury	0.132 mg/L 0.000044 mg/L	0.132U mg/L 0.000100U mg/L

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
HS-09SC-0-2-220122DUP (HS-08SC-0-2-220120 HS-08SC-2-3-220120 FD-20220122 HS-07SC-0-2-220122 HS-07SC-2-3-220122 HS-09SC-0-2-220122 HS-09SC-2-3-220122)	Copper	32.3 (≤30)	-	J (all detects)	A

VIII. Serial Dilution

Serial dilution was not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples FD-20220122 and HS-07SC-0-2-220122 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122	HS-07SC-0-2-220122		
Arsenic	14.1	11.5	-	2.6 (≤45.2)
Cadmium	1.45	1.36	-	0.09 (≤1.81)
Copper	152	140	8 (≤50)	-

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122	HS-07SC-0-2-220122		
Zinc	262	220	17 (≤50)	-

XI. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to DUP RPD, data were qualified as estimated in seven samples.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

Port of Bellingham
Metals - Data Qualification Summary - SDG 22B0007

Sample	Analyte	Flag	A or P	Reason
HS-08SC-0-2-220120 HS-08SC-2-3-220120 FD-20220122 HS-07SC-0-2-220122 HS-07SC-2-3-220122 HS-09SC-0-2-220122 HS-09SC-2-3-220122	Copper	J (all detects)	A	Duplicate sample analysis (RPD)

Port of Bellingham
Metals - Laboratory Blank Data Qualification Summary - SDG 22B0007

Sample	Analyte	Modified Final Concentration	A or P
HS-COMP-A-220120(TCLP)	Barium Mercury	0.0986U mg/L 0.000100U mg/L	A
HS-COMP-B-220121(TCLP)	Barium Mercury	0.132U mg/L 0.000100U mg/L	A

LDC #: 53482A4b

SDG #: 22B0007

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 3/16/22

Page: 1 of 1

Reviewer:

2nd Reviewer:

METHOD: Metals (EPA SW-846 Method 6010D/7470A)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, A	
II.	Instrument Calibration	A	
III.	ICP Interference Check Sample (ICS) Analysis	A	
IV.	Laboratory Blanks	SW	
V.	Field Blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	
VII.	Duplicate sample analysis	SW	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS
X.	Field Duplicates	SW	(3, 4)
XI.	Target Analyte Quantitation	N	
XII	Overall Assessment of Data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-08SC-0-2-220120	22B0007-13	Sediment	01/20/22
2	HS-08SC-2-3-220120	22B0007-14	Sediment	01/20/22
3	FD-20220122	22B0007-37	Sediment	01/22/22
4	HS-07SC-0-2-220122	22B0007-38	Sediment	01/22/22
5	HS-07SC-2-3-220122	22B0007-39	Sediment	01/22/22
6	HS-09SC-0-2-220122	22B0007-43	Sediment	01/22/22
7	HS-09SC-2-3-220122	22B0007-44	Sediment	01/22/22
8	HS-COMP-A-220120(TCLP)	22B0007-18(TCLP)	Sediment	01/20/22
9	HS-COMP-B-220121(TCLP)	22B0007-36(TCLP)	Sediment	01/21/22
10	HS-09SC-0-2-220122MS	22B0007-43MS	Sediment	01/22/22
11	HS-09SC-0-2-220122DUP	22B0007-43DUP	Sediment	01/22/22
12	HS-COMP-A-220120(TCLP)MS	22B0007-18(TCLP)MS	Sediment	01/20/22
13	HS-COMP-A-220120(TCLP)DUP	22B0007-18(TCLP)DUP	Sediment	01/20/22
14				
15				
16				

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1 to 7	As, Cd, Cu, Zn
8, 9	As, Ba, Cd, Cr, Pb, Se, Ag, Hg
QC	
10, 11	As, Cd, Cu, Zn
12, 13	As, Ba, Cd, Cr, Pb, Se, Ag, Hg

Analysis Method

ICP	As, Ba, Cd, Cr, Cu Pb, Se, Ag, Zn
ICP-MS	
CVAA	Hg

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/L Associated Samples: 8, 9

				Sample Identification								
Analyte	**PB (mg/L)**	**Maximum ICB/CCB (mg/L)**	**Action Level**	8	9							
Ba	0.0491		0.2455	0.0986	0.132							
Hg	0.000044	0.000043	0.00022	0.000045 / 0.000100	0.000044 / 0.000100							

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Laboratory duplicate analysis was performed by the laboratory. All laboratory duplicates were with the relative percent difference (RPD) for samples >5X the reporting limits with the exceptions listed below. If samples were <5X the reporting limits, the difference was within 1X the reporting limit for water samples and within 2X the reporting limit for soil samples for all samples with the exceptions listed below.

Duplicate ID	Matrix	Analyte	RPD	RPD Limit	Difference (units)	Difference Limit	Associated Samples	Qualification	Det/ND
11	s	Cu	32.3	30			1 to 7	J/UJ/A	Det

Comments:

Method: Metals

Analyte	Concentration (mg/Kg)		RPD (≤ 50)	Diff.	Diff. Limits
	3	4			
Arsenic	14.1	11.5		2.6	(≤45.2)
Cadmium	1.45	1.36		0.09	(≤1.81)
Copper	152	140	8		
Zinc	262	220	17		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: March 24, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0007

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-08SC-0-2-220120	22B0007-13	Sediment	01/20/22
HS-08SC-2-3-220120	22B0007-14	Sediment	01/20/22
FD-20220122	22B0007-37	Sediment	01/22/22
HS-07SC-0-2-220122	22B0007-38	Sediment	01/22/22
HS-07SC-2-3-220122	22B0007-39	Sediment	01/22/22
HS-09SC-0-2-220122	22B0007-43	Sediment	01/22/22
HS-09SC-2-3-220122	22B0007-44	Sediment	01/22/22
HS-09SC-0-2-220122MS	22B0007-43MS	Sediment	01/22/22
HS-09SC-0-2-220122DUP1	22B0007-43DUP1	Sediment	01/22/22
HS-09SC-0-2-220122DUP2	22B0007-43DUP2	Sediment	01/22/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A
Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples FD-20220122 and HS-07SC-0-2-220122 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)
	FD-20220122	HS-07SC-0-2-220122		
Total solids	54.87	55.71	2 (≤50)	-
Total organic carbon	1.88	1.53	21 (≤50)	-

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Port of Bellingham
Wet Chemistry - Data Qualification Summary - SDG 22B0007

No Sample Data Qualified in this SDG

Port of Bellingham
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22B0007

No Sample Data Qualified in this SDG

LDC #: 53482A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 3/16/22
SDG #: 22B0007 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: (Analyte) TOC (EPA SW-846 Method 9060A), Total Solids (SM2540G)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A+A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	
VII.	Duplicate sample analysis	A	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	(3,4)
X.	Target Analyte Quantitation	N	
XI	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-08SC-0-2-220120	22B0007-13	Sediment	01/20/22
2	HS-08SC-2-3-220120	22B0007-14	Sediment	01/20/22
3	FD-20220122	22B0007-37	Sediment	01/22/22
4	HS-07SC-0-2-220122	22B0007-38	Sediment	01/22/22
5	HS-07SC-2-3-220122	22B0007-39	Sediment	01/22/22
6	HS-09SC-0-2-220122	22B0007-43	Sediment	01/22/22
7	HS-09SC-2-3-220122	22B0007-44	Sediment	01/22/22
8	HS-09SC-0-2-220122MS	22B0007-43MS	Sediment	01/22/22
9	HS-09SC-0-2-220122DUP	22B0007-43DUP	Sediment	01/22/22
10	HS-09SC-0-2-220122~~TRP~~ D22	22B0007-43~~TRP~~ D22	Sediment	01/22/22
11				
12				
13				
14				
15				

Notes:

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
All	TS, TOC
QC	
8	TOC
9	TOC, TS
10	TS

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer:CR

Method: Inorganics

Analyte	Concentration (mg/Kg)		RPD (≤ 50)	Diff.	Diff. Limits
	3	4			
Total solids	54.87	55.71	2		
TOC	1.88	1.53	21		

LDC #: 53482

EDD POPULATION COMPLETENESS WORKSHEET

Anchor

Date: 3-28
Page: 1 of 1
2nd Reviewer: SR

The LDC job number listed above was entered by WH.

	EDD Process	Y/N	Initial	Comments/Action
I.	EDD Completeness	-		
Ia.	- All methods present?	Y	WH	
Ib.	- All samples present/match report?	Y	WH	
Ic.	- All reported analytes present?	Y	WH	
Id.	- 10% or 100% verification of EDD?	Y	WH	10%
II.	EDD Preparation/Entry	-		
IIa.	- QC Level applied? (EPAStage2B or EPAStage4)	Y	WH	EPAStage2B
IIb.	- Laboratory EMPC qualified results qualified (J with reason code 23)?	NA	WH	
III.	Reasonableness Checks	-		
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	Y	WH	
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	Y	WH	
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	Y	WH	
IIId.	- Do blank concentrations in report match EDD, where data was qualified due to blank?	Y	WH	
IIIe.	- Is the detect flag set to "N" for all "U" qualified blank results?	Y	WH	
IIIf.	- Were there multiple results due to dilutions/reanalysis? If so, were results qualified appropriately?	Y/Y	WH	
IIIg.	-Are all results marked reportable "Yes" unless rejected for overall assessment in the data validation report?	Y	WH	
IIIh.	-Are there any lab "R" qualified data? / Are the entry columns blank for these results?	NA	WH	
IIIi.	-Are there any discrepancies between the data packet and the EDD?	N	WH	

Notes: *see discrepancy sheet

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

April 22, 2022

SUBJECT: Port of Bellingham, Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on March 9, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #53706:

SDG #	Fraction
22B0184	Polynuclear Aromatic Hydrocarbons, Polychlorinated Biphenyls, Metals, Total Suspended Solids

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020).
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

7 pages-ADV

Attachment 1

Stage 2B EDD

LDC# 53706 (Anchor Environmental - Seattle, WA / Port of Bellingham)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270E)		PCBs (8082A)		(4) Metals (6010D)		(4)Diss Metals (6010D)		TSS (160.2)																							
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	22B0184	03/09/22	03/30/22	3	0	3	0	3	0	3	0	3	0																						
Total	T/KK			3	0	3	0	3	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

V:\LOGIN\Anchor\Port of Bellingham\53706ST.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: April 21, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0184

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
DRET-HS-COMP-A1-220120	22B00184-05	Water	02/08/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270E

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

Instrument performance check was performed at the required frequency.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For analytes where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

Samples DRET-HS-COMP-A-220120 and DRET-HS-COMP-A1-220120 were identified as field duplicates. No results were detected in any of the samples.

XI. Internal Standards

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

XII. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 22B0184

No Sample Data Qualified in this SDG

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 22B0184

No Sample Data Qualified in this SDG

LDC #: 53706A2a

SDG #: 22B0184

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 04/19/22

Page: 1 of 1

Reviewer: JM

2nd Reviewer: [illegible]

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	RSD ≤ 20% r² ICV ≤ 30%
IV.	Continuing calibration	A	%D ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	A	LCS/D
X.	Field duplicates	ND	D = 1, 3
XI.	Internal standards	A	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
2	DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
3	DRET-HS-COMP-A1-220120	22B00184-05	Water	02/08/22
4				
5				
6				
7				
8				
9				

Notes:

-	BKB0334-BLK1						

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: April 22, 2022

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0184

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
DRET-HS-COMP-A1-220120	22B00184-05	Water	02/08/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

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

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples DRET-HS-COMP-A-220120 and DRET-HS-COMP-A1-220120 were identified as field duplicates. No results were detected in any of the samples.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Polychlorinated Biphenyls - Data Qualification Summary - SDG 22B0184

No Sample Data Qualified in this SDG

Port of Bellingham
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG 22B0184

No Sample Data Qualified in this SDG

LDC #: 53706A3b

SDG #: 22B0184

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 04/19/22

Page: 1 of 1

Reviewer: JVB

2nd Reviewer: AP

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A / A	RSD ≤ 20% ICV ≤ 20%
III.	Continuing calibration	A	%D ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes /IS	A / A	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	LCSD
IX.	Field duplicates	N / A	D = 1+3
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
2	DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
3	DRET-HS-COMP-A1-220120	22B00184-05	Water	02/08/22
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Notes:

-	BKB0333-blk1						

Note: case narrative indicated cov4 out, NQ-ending

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: April 21, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0184

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
DRET-HS-COMP-A1-220120	22B00184-05	Water	02/08/22
DRET-HS-COMP-A-220120F	22B00184-02	Water	02/08/22
DRET-HS-COMP-B-220121F	22B00184-04	Water	02/08/22
DRET-HS-COMP-A1-220120F	22B00184-06	Water	02/08/22
DRET-HS-COMP-B-220121MS	22B00184-03MS	Water	02/08/22
DRET-HS-COMP-B-220121DUP	22B00184-03DUP	Water	02/08/22
DRET-HS-COMP-A-220120FMS	22B00184-02MS	Water	02/08/22
DRET-HS-COMP-A-220120FDUP	22B00184-02DUP	Water	02/08/22

Samples appended with "F" were analyzed as dissolved

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Arsenic, Cadmium, Copper, and Zinc by Environmental Protection Agency (EPA) SW 846 Method 6010D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Instrument Calibration

Initial and continuing calibrations were performed as required by the method.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

III. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Copper	0.0015 mg/L	DRET-HS-COMP-A-220120 DRET-HS-COMP-B-220121 DRET-HS-COMP-A1-220120

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
DRET-HS-COMP-B-220121	Copper	0.0267 mg/L	0.0300U mg/L

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Serial Dilution

Serial dilution was not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples DRET-HS-COMP-A-220120 and DRET-HS-COMP-A1-220120 and samples DRET-HS-COMP-A-220120F and DRET-HS-COMP-A1-220120F were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)
	DRET-HS-COMP-A-220120	DRET-HS-COMP-A1-220120		
Copper	0.0334	0.0326	-	0.0008 (≤0.15)
Cadmium	0.0112	0.0116	-	0.0004 (≤0.1)

XI. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to laboratory blank contamination, data were qualified as not detected in one sample.

Port of Bellingham
Metals - Data Qualification Summary - SDG 22B0184

No Sample Data Qualified in this SDG

Port of Bellingham
Metals - Laboratory Blank Data Qualification Summary - SDG 22B0184

Sample	Analyte	Modified Final Concentration	A or P
DRET-HS-COMP-B-220121	Copper	0.0300U mg/L	A

LDC #: 53706A4b

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 4/15/22

SDG #: 22B0184

Page: 1 of 1

Laboratory: Analytical Resources, Inc., Tukwila, WA

Reviewer: KK

2nd Reviewer:

METHOD: Metals (EPA SW-846 Method 6010D)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Instrument Calibration	A	
III.	ICP Interference Check Sample (ICS) Analysis	A	
IV.	Laboratory Blanks	SW	
V.	Field Blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	
VII.	Duplicate sample analysis	A	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS
X.	Field Duplicates	SW	(1,3), (4,6)*
XI.	Target Analyte Quantitation	N	
XII.	Overall Assessment of Data	A	

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

Samples appended with F were analyzed as dissolved.

	Client ID	Lab ID	Matrix	Date
1	DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
2	DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
3	DRET-HS-COMP-A1-220120	22B00184-05	Water	02/08/22
4	DRET-HS-COMP-A-220120F	22B00184-02	Water	02/08/22
5	DRET-HS-COMP-B-220121F	22B00184-04	Water	02/08/22
6	DRET-HS-COMP-A1-220120F	22B00184-06	Water	02/08/22
7	DRET-HS-COMP-B-220121MS	22B00184-03MS	Water	02/08/22
8	DRET-HS-COMP-B-220121DUP	22B00184-03DUP	Water	02/08/22
9	DRET-HS-COMP-A-220120FMS	22B00184-02MS	Water	02/08/22
10	DRET-HS-COMP-A-220120FDUP	22B00184-02DUP	Water	02/08/22
11				
12				
13				
14				
15				
16				

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1-6	As, Cd, Cu, Zn
QC	
7	As, Cd, Cu, Zn
8	As, Cd, Cu, Zn
9	As, Cd, Cu, Zn
10	As, Cd, Cu, Zn

Analysis Method

ICP	As, Cd, Cu, Zn
ICP-MS	
CVAA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/L Associated Samples: 1-3

				Sample Identification								
Analyte	**PB (units)**	**Maximum ICB/CCB (units)**	**Action Level**	2								
Cu		0.0015		0.0267/0.0300								

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

Method: Metals

Analyte	Concentration (mg/L)		RPD (≤ 50)	Diff.	Diff. Limits	Qualifiers (Parents Only)
	1	3				
Copper	0.0334	0.0326		0.0008	(≤0.15)	
Cadmium	0.0112	0.0116		0.0004	(≤0.1)	

Analyte	Concentration (mg/L)		RPD (≤ 30)	Diff.	Diff. Limits	Qualifiers (Parents Only)

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: April 21, 2022

Parameters: Total Suspended Solids

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22B0184

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
DRET-HS-COMP-B1-220121	22B00184-07	Water	02/08/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Total Suspended Solids by Environmental Protection Agency (EPA) Method 160.2

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples DRET-HS-COMP-B-220121 and DRET-HS-COMP-B1-220121 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD (Limits)	Difference (Limits)
	DRET-HS-COMP-B-220121	DRET-HS-COMP-B1-220121		
Total suspended solids	10	10	0 (≤50)	-

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Total Suspended Solids - Data Qualification Summary - SDG 22B0184

No Sample Data Qualified in this SDG

Port of Bellingham
Total Suspended Solids - Laboratory Blank Data Qualification Summary - SDG 22B0184

No Sample Data Qualified in this SDG

LDC #: 53706A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 4/15/22
SDG #: 22B0184 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer: KK
2nd Reviewer:

METHOD: (Analyte) TSS (EPA Method 160.2)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	
VII.	Duplicate sample analysis	N	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	(2,3)
X.	Target Analyte Quantitation	N	
XI	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	DRET-HS-COMP-A-220120	22B00184-01	Water	02/08/22
2	DRET-HS-COMP-B-220121	22B00184-03	Water	02/08/22
3	DRET-HS-COMP-B1-220121	22B00184-07	Water	02/08/22
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

Method: Inorganics

≤50

Analyte	Concentration (mg/L)		RPD (≤~~20~~)	Diff.	Diff. Limits	Qualifiers (Parents Only)
	2	3				
TSS	10	10	0			

LDC #: 53706

EDD POPULATION COMPLETENESS WORKSHEET

Anchor

Date: 4/22/22
Page: 1 of 1
2nd Reviewer: _____

The LDC job number listed above was entered by WH.

	EDD Process	Y/N	Initial	Comments/Action
I.	EDD Completeness	-		
Ia.	- All methods present?	Y	WH	method 160.2 ~~& SM2540D~~
Ib.	- All samples present/match report?	Y	WH	
Ic.	- All reported analytes present?	Y	WH	
Id.	- 10% or 100% verification of EDD?	Y	WH	10%
II.	EDD Preparation/Entry	-		
IIa.	- QC Level applied? (EPAStage2B or EPAStage4)	Y	WH	EPAStage 2B
IIb.	- Laboratory EMPC qualified results qualified (J with reason code 23)?	NA	WH	
III.	Reasonableness Checks	-		
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	Y	WH	
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	Y	WH	
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	Y	WH	
IIId.	- Do blank concentrations in report match EDD, where data was qualified due to blank?	Y	WH	
IIIe.	- Is the detect flag set to "N" for all "U" qualified blank results?	Y	WH	
IIIf.	- Were there multiple results due to dilutions/reanalysis? If so, were results qualified appropriately?	NA	WH	
IIIg.	-Are all results marked reportable "Yes" unless rejected for overall assessment in the data validation report?	Y	WH	
IIIh.	-Are there any lab "R" qualified data? / Are the entry columns blank for these results?	NA	WH	
IIIi.	-Are there any discrepancies between the data packet and the EDD?	N	WH	

Notes: *see discrepancy sheet

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

May 12, 2022

SUBJECT: Port of Bellingham, Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on February 14, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

Revision: PAH: Updated the MSD %R for phenanthrene
PCB: Corrected Congeners to Aroclors

LDC Project #53481:

SDG #	Fraction
22A0533	Polynuclear Aromatic Hydrocarbons, Polychlorinated Biphenyls as Congeners, Metals, Wet Chemestry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020).
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

March 28, 2022

SUBJECT: Port of Bellingham, Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on February 14, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #53481:

SDG #	Fraction
22A0533	Polynuclear Aromatic Hydrocarbons, Polychlorinated Biphenyls as Congeners, Metals, Wet Chemestry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020).
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

Stage 2B EDD

LDC# 53481 (Anchor Environmental - Seattle, WA / Port of Bellingham)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270E)		PCBs (8082A)		(4) Metals (6010D)		TOC (9060A)		Total Solids (2540G)																									
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	22A0533	02/14/22	03/08/22	0	21	0	17	0	17	0	17	0	17																						
Total	T/CR			0	21	0	17	0	17	0	17	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: May 12, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22A0533

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
HS-01SG-0-12-220118DL	22A0533-01DL	Sediment	01/18/22
HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
HS-01SG-12-18-220118DL	22A0533-02DL	Sediment	01/18/22
HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
HS-03SG-0-12-220118DL	22A0533-05DL	Sediment	01/18/22
HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
HS-1005SG-0-12-220119	22A0533-09	Sediment	01/19/22
HS-05SG-0-12-220119	22A0533-10	Sediment	01/19/22
HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22
HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
HS-06SG-0-12-220119DL	22A0533-12DL	Sediment	01/19/22
HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
HS-08SS-220118	22A0533-15	Sediment	01/18/22
HS-10SS-220118	22A0533-17	Sediment	01/18/22
HS-11SS-220118	22A0533-18	Sediment	01/18/22
HS-12SS-220119	22A0533-19	Sediment	01/19/22
HS-01SG-12-18-220118MS	22A0533-02MS	Sediment	01/18/22
HS-01SG-12-18-220118MSD	22A0533-02MSD	Sediment	01/18/22
HS-02SG-12-17-220118MS	22A0533-04MS	Sediment	01/18/22
HS-02SG-12-17-220118MSD	22A0533-04MSD	Sediment	01/18/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270E

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

Instrument performance check was performed at the required frequency.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
02/08/22	Fluoranthene	20.7	HS-01SG-0-12-220118DL HS-01SG-12-18-220118 HS-06SG-0-12-220119DL HS-10SS-220118 HS-11SS-220118 HS-12SS-220119	J (all detects)	A
02/09/22	Fluoranthene	25.8	HS-01SG-12-18-220118DL HS-03SG-0-12-220118DL	J (all detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
HS-01SG-12-18-220118MS/MSD (HS-01SG-12-18-220118 HS-01SG-12-18-220118DL)	Phenanthrene	354 (50-150)	781 (50-150)	J (all detects)	A
	Benzo(a)anthracene	233 (50-150)	570 (50-150)	J (all detects)	
	Chrysene	352 (50-150)	734 (50-150)	J (all detects)	
	Benzo(a)pyrene	173 (50-150)	587 (50-150)	J (all detects)	
	Fluorene	-	152 (50-150)	J (all detects)	
	Anthracene	-	322 (50-150)	J (all detects)	
	Benzofluoranthenes, total	171 (50-150)	459 (50-150)	J (all detects)	
	Indeno(1,2,3-cd)pyrene	-	163 (50-150)	J (all detects)	

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
HS-01SG-12-18-220118MS/MSD (HS-01SG-12-18-220118 HS-01SG-12-18-220118DL)	Phenanthrene	55.0 (≤35)	J (all detects)	A
	Anthracene	57.9 (≤35)	J (all detects)	
	Benzo(a)anthracene	48.7 (≤35)	J (all detects)	
	Chrysene	43.5 (≤35)	J (all detects)	
	Benzofluoranthenes, total	49.7 (≤35)	J (all detects)	
	Benzo(a)pyrene	60.4 (≤35)	J (all detects)	

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

Samples HS-1005SG-0-12-220119 and HS-05SG-0-12-220119 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)
	HS-1005SG-0-12-220119	HS-05SG-0-12-220119		
Naphthalene	14.3	17.0	-	3 (≤40)
2-Methylnaphthalene	7.5	7.3	-	0 (≤40)
Acenaphthylene	16.7	17.1	-	0 (≤40)
Acenaphthene	18.0	12.3	-	6 (≤40)
Fluorene	26.4	30.6	-	4 (≤50)
Phenanthrene	233	164	35 (≤50)	-
Anthracene	68.8	79.4	-	11 (≤40)
Fluoranthene	373	340	9 (≤50)	-
Pyrene	354	343	3 (≤50)	-
Benzo(a)anthracene	122	204	50 (≤50)	-
Chrysene	215	330	42 (≤50)	-
Benzofluoranthenes, total	241	330	31 (≤50)	-
Benzo(a)pyrene	112	147	27 (≤50)	-
Indeno(1,2,3-cd)pyrene	45.6	54.4	-	9 (≤50)
Dibenzo(a,h)anthracene	17.9	19.7	-	2 (≤50)
Benzo(g,h,i)perylene	40.1	55.1	-	15 (≤50)

XI. Internal Standards

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

XII. Target Analyte Quantitation

All target analyte quantitations met validation criteria with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
HS-01SG-0-12-220118 HS-01SG-12-18-220118 HS-06SG-0-12-220119	Fluoranthene Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A
HS-03SG-0-12-220118	Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
HS-01SG-0-12-220118 HS-01SG-12-18-220118 HS-06SG-0-12-220119	Fluoranthene Pyrene	Results exceeded calibration range.	Not reportable	-
HS-01SG-0-12-220118DL HS-01SG-12-18-220118DL HS-06SG-0-12-220119DL	All analytes except Fluoranthene Pyrene	Results from undiluted analyses were more usable.	Not reportable	-
HS-03SG-0-12-220118	Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene	Results exceeded calibration range.	Not reportable	-

Sample	Analyte	Reason	Flag	A or P
HS-03SG-0-12-220118DL	All analytes except Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene	Results from undiluted analyses were more usable.	Not reportable	-

Due to continuing calibration %D and MS/MSD %R and RPD, data were qualified as estimated in eight samples.

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 22A0533

Sample	Analyte	Flag	A or P	Reason
HS-01SG-0-12-220118DL HS-06SG-0-12-220119DL HS-10SS-220118 HS-11SS-220118 HS-12SS-220119 HS-01SG-12-18-220118DL HS-03SG-0-12-220118DL	Fluoranthene	J (all detects)	A	Continuing calibration (%D)
HS-01SG-12-18-220118	Fluorene Indeno(1,2,3-cd)pyrene	J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
HS-01SG-12-18-220118	Phenanthrene Anthracene Benzo(a)anthracene Chrysene Benzofluoranthenes, total Benzo(a)pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)(RPD)
HS-01SG-0-12-220118 HS-01SG-12-18-220118 HS-06SG-0-12-220119	Fluoranthene Pyrene	Not reportable	-	Overall assessment of data
HS-01SG-0-12-220118DL HS-01SG-12-18-220118DL HS-06SG-0-12-220119DL	All analytes except Fluoranthene Pyrene	Not reportable	-	Overall assessment of data
HS-03SG-0-12-220118	Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene	Not reportable	-	Overall assessment of data
HS-03SG-0-12-220118DL	All analytes except Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene	Not reportable	-	Overall assessment of data

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 22A0533

No Sample Data Qualified in this SDG

LDC #: 53481A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 03/16/22
SDG #: 22A0533 Stage 2B Page: 1 of 2
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer: SVG
2nd Reviewer:

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A, A	RSD ≤ 20% ICV ≤ 30%
IV.	Continuing calibration	SW	%D ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS/D
X.	Field duplicates	SW	D = 12/13
XI.	Internal standards	A	
XII.	Target analyte quantitation	SW	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	

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

	Client ID	Lab ID	Matrix	Date
1	HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
2	HS-01SG-0-12-220118DL	22A0533-01DL	Sediment	01/18/22
3 2	HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
4 2	HS-01SG-12-18-220118DL	22A0533-02DL	Sediment	01/18/22
5	HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
6	HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
7	HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
8	HS-03SG-0-12-220118DL	22A0533-05DL	Sediment	01/18/22
9	HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
10	HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
11	HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
12	HS-1005SG-0-12-220119 D	22A0533-09	Sediment	01/19/22
13	HS-05SG-0-12-220119 D	22A0533-10	Sediment	01/19/22
14	HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22

LDC #: 53481A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 07/16/22
SDG #: 22A0533 Stage 2B Page: 2 of 2
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer: SVC
2nd Reviewer:

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E)

	Client ID	Lab ID	Matrix	Date
15	HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
16	HS-06SG-0-12-220119DL	22A0533-12DL	Sediment	01/19/22
17	HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
18	HS-08SS-220118	22A0533-15	Sediment	01/18/22
19	HS-10SS-220118	22A0533-17	Sediment	01/18/22
20	HS-11SS-220118	22A0533-18	Sediment	01/18/22
21	HS-12SS-220119	22A0533-19	Sediment	01/19/22
22	HS-01SG-12-18-220118MS	22A0533-02MS	Sediment	01/18/22
23	HS-01SG-12-18-220118MSD	22A0533-02MSD	Sediment	01/18/22
24	HS-02SG-12-17-220118MS	22A0533-04MS	Sediment	01/18/22
25	HS-02SG-12-17-220118MSD	22A0533-04MSD	Sediment	01/18/22
26				
27				
28				

Notes:

1	BKA0647-BLK1						
2	BKB0065-1						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	GG. Acenaphthene	MMM. Bis(2-Chloroisopropyl)ether	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	Y1. 3,3'-Dimethylbenzidine
B. Bis (2-chloroethyl) ether	HH. 2,4-Dinitrophenol	NNN. Aniline	TTTT. 1-Methyldibenzothiophene (1MDT)	Z1. o-Toluidine
C. 2-Chlorophenol	II. 4-Nitrophenol	OOO. N-Nitrosodimethylamine	UUUU.. 2,3,4,6-Tetrachlorophenol	A2. Benzo(j)fluoranthene
D. 1,3-Dichlorobenzene	JJ. Dibenzofuran	PPP. Benzoic Acid	VVVV. 1,2,4,5-Tetrachlorobenzene	B2. Benzofluoranthenes, total
E. 1,4-Dichlorobenzene	KK. 2,4-Dinitrotoluene	QQQ. Benzyl alcohol	WWWW.. 2-Picoline	C2. trans-Decalin
F. 1,2-Dichlorobenzene	LL. Diethylphthalate	RRR. Pyridine	XXXX. 3-Methylcholanthrene	D2. cis-Decalin
G. 2-Methylphenol	MM. 4-Chlorophenyl-phenyl ether	SSS. Benzidine	YYYY. a,a-Dimethylphenethylamine	E2. Dibenzo(a)anthracenes
H. 2,2'-Oxybis(1-chloropropane)	NN. Fluorene	TTT. 1-Methylnaphthalene	ZZZZ. Hexachloropropene	F2. Benzo(j)+(k)fluoranthene
I. 4-Methylphenol	OO. 4-Nitroaniline	UUU.Benzo(b)thiophene	A1. N-Nitrosodiethylamine	G2. Dibenzo(ah)+(ac)anthracene
J. N-Nitroso-di-n-propylamine	PP. 4,6-Dinitro-2-methylphenol	VVV.Benzonaphthothiophene	B1. N-Nitrosodi-n-butylamine	H2. Bis(2-ethylhexyl)adipate
K. Hexachloroethane	QQ. N-Nitrosodiphenylamine	WWW.Benzo(e)pyrene	C1. N-Nitrosomethylethylamine	I2.
L. Nitrobenzene	RR. 4-Bromophenyl-phenylether	XXX. 2,6-Dimethylnaphthalene	D1. N-Nitrosomorpholine	J2.
M. Isophorone	SS. Hexachlorobenzene	YYY. 2,3,5-Trimethylnaphthalene	E1. N-Nitrosopyrrolidine	K2.
N. 2-Nitrophenol	TT. Pentachlorophenol	ZZZ. Perylene	F1. Phenacetin	L2.
O. 2,4-Dimethylphenol	UU. Phenanthrene	AAAA. Dibenzothiophene	G1. 2-Acetylaminofluorene	M2.
P. Bis(2-chloroethoxy)methane	VV. Anthracene	BBBB. Benzo(a)fluoranthene	H1. Pronamide	N2.
Q. 2,4-Dichlorophenol	WW. Carbazole	CCCC. Benzo(b)fluorene	I1. Methyl methanesulfonate	O2.
R. 1,2,4-Trichlorobenzene	XX. Di-n-butylphthalate	DDDD. cis/trans-Decalin	J1. Ethyl methanesulfonate	P2.
S. Naphthalene	YY. Fluoranthene	EEEE. Biphenyl	K1. o,o',o''-Triethylphosphorothioate	Q2.
T. 4-Chloroaniline	ZZ. Pyrene	FFFF. Retene	L1. n-Phenylene diamine	R2.
U. Hexachlorobutadiene	AAA. Butylbenzylphthalate	GGGG. C30-Hopane	M1. 1,4-Naphthoquinone	S2.
V. 4-Chloro-3-methylphenol	BBB. 3,3'-Dichlorobenzidine	HHHH. 1-Methylphenanthrene	N1. N-Nitro-o-toluidine	T2.
W. 2-Methylnaphthalene	CCC. Benzo(a)anthracene	IIII. 1,4-Dioxane	O1. 1,3,5-Trinitrobenzene	U2.
X. Hexachlorocyclopentadiene	DDD. Chrysene	JJJJ. Acetophenone	P1. Pentachlorobenzene	V2..
Y. 2,4,6-Trichlorophenol	EEE. Bis(2-ethylhexyl)phthalate	KKKK. Atrazine	Q1. 4-Aminobiphenyl	W2
Z. 2,4,5-Trichlorophenol	FFF. Di-n-octylphthalate	LLLL. Benzaldehyde	R1. 2-Naphthylamine	X2..
AA. 2-Chloronaphthalene	GGG. Benzo(b)fluoranthene	MMMM. Caprolactam	S1. Triphenylene	Y2.
BB. 2-Nitroaniline	HHH. Benzo(k)fluoranthene	NNNN. 2,6-Dichlorophenol	T1. Octachlorostyrene	Z2.
CC. Dimethylphthalate	III. Benzo(a)pyrene	OOOO. 1,2-Diphenylhydrazine	U1. Famphur	
DD. Acenaphthylene	JJJ. Indeno(1,2,3-cd)pyrene	PPPP. 3-Methylphenol	V1. 1,4-phenylenediamine	
EE. 2,6-Dinitrotoluene	KKK. Dibenz(a,h)anthracene	QQQQ. 3&4-Methylphenol	W1. Methapyrilene	
FF. 3-Nitroaniline	LLL. Benzo(g,h,i)perylene	RRRR. 4-Dimethyldibenzothiophene	X1. Pentachloroethane	

LDC #: 53481A2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JVG

METHOD: GC/MS BNA (EPA SW 846 Method 8270E)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?
Y (N) N/A Were percent differences (%D) ≤20 % and relative response factors (RRF) within the method criteria?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit)	Associated Samples	Qualifications
	02/08/22	NT1022020802	YY	20.7		2, 3, 16, ~~17~~, 19-21, MB2 (Det)	J/UJ/A
	02/09/22	NT1022020907	YY	25.8		4, 8 (Det)	

Note: * Ave RRF failed method criteria but within validation criteria

LDC #: 53481A2a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: JVG

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

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

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

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

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	22/23	UU	354 (50-150)	781 (50-150)	( )	3, 4 (Det)	J dets/A
		CCC	233 ( )	570 ( )	( )		
		DDD	352 ( )	734 ( )	( )		
		III	173 ( )	587 ( )	( )		
		NN	( )	152 ( )	( )		
		VV	( )	322 ( )	( )		
		B2	171 (50-150)	459 ( )	( )		
		JJJ	( )	163 ( )	( )		
		UU	( )	( )	55.0 (35)		
		VV	( )	( )	57.9 ( )		
		CCC	( )	( )	48.7 ( )		
		DDD	( )	( )	43.5 ( )		
		B2	( )	( )	49.7 ( )		
		III	( )	( )	60.4 ( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC#: 53481A2a

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG

METHOD: GCMS SVOA (EPA SW 846 Method 8270E)

Compound	Concentration (ug/Kg)		RPD (≤50%)	Difference (ug/Kg)	Limits (±2XRL)
	12	13			
S	14.3	17.0		3	≤40
W	7.5	7.3		0	≤40
DD	16.7	17.1		0	≤40
GG	18.0	12.3		6	≤40
NN	26.4	30.6		4	
UU	233	164	35		
VV	68.8	79.4		11	≤40
YY	373	340	9		
ZZ	354	343	3		
CCC	122	204	50		
DDD	215	330	42		
B2	241	330	31		
III	112	147	27		
JJJ	45.6	54.4		9	
KKK	17.9	19.7		2	
LLL	40.1	55.1		15	

LDC #: 53481A2q

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported RLs

Reviewer: JVG

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

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

(Y) N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

(Y) N N/A Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Sample ID	Compound	Finding	Qualifications
	1, 3, 15	YY, ZZ	> cal range	J detects / A
	7	UU, YY, ZZ, CCC, DDD	↓	↓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 53481A2a

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVG

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.
(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Compound	Finding	Qualifications
		1, 3, 15	YY, ZZ	> cal range	NR
		2, 4, 16	All except above	dil	
		7	UU, YY, ZZ, CCC, DDD	> cal range	
		8	All except above	dil	

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: May 12, 2022

Parameters: Polychlorinated Biphenyls as Aroclors

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22A0533

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
HS-1005SG-0-12-220119	22A0533-09	Sediment	01/19/22
HS-05SG-0-12-220119	22A0533-10	Sediment	01/19/22
HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22
HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
HS-08SS-220118	22A0533-15	Sediment	01/18/22
HS-10SS-220118	22A0533-17	Sediment	01/18/22
HS-11SS-220118	22A0533-18	Sediment	01/18/22
HS-12SS-220119	22A0533-19	Sediment	01/19/22
HS-12SS-220119MS	22A0533-19MS	Sediment	01/19/22
HS-12SS-220119MSD	22A0533-19MSD	Sediment	01/19/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) as Aroclors by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

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

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples HS-06SG-0-12-220119 and HS-06SG-12-17-220119 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)
	HS-06SG-0-12-220119	HS-06SG-12-17-220119		
Aroclor-1254	18.0	22.1	-	4 (≤40)
Aroclor-1260	24.3	18.7	-	6 (≤40)

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Polychlorinated Biphenyls as Aroclors - Data Qualification Summary - SDG 22A0533

No Sample Data Qualified in this SDG

Port of Bellingham
Polychlorinated Biphenyls as Aroclors - Laboratory Blank Data Qualification Summary - SDG 22A0533

No Sample Data Qualified in this SDG

LDC #: 53481A3b

SDG #: 22A0533

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 03/16/22

Page: 1 of 2

Reviewer: JVG

2nd Reviewer:

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/A	RSD ≤ 20% ICV ≤ 20%.
III.	Continuing calibration	A	%D ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes /IS	A/A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	D = 9/10
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII.	Overall assessment of data	A	

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

	Client ID.	Lab ID	Matrix	Date
1	HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
2	HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
3	HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
4	HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
5	HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
6	HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
7	HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
8	HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
9	HS-1005SG-0-12-220119 D	22A0533-09	Sediment	01/19/22
10	HS-05SG-0-12-220119 D	22A0533-10	Sediment	01/19/22
11	HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22
12	HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
13	HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
14	HS-08SS-220118	22A0533-15	Sediment	01/18/22
15	HS-10SS-220118	22A0533-17	Sediment	01/18/22
16	HS-11SS-220118	22A0533-18	Sediment	01/18/22
17	HS-12SS-220119	22A0533-19	Sediment	01/19/22

LDC #: 53481A3b

SDG #: 22A0533

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 03/16/22

Reviewer: JVG

2nd Reviewer:

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

	Client ID	Lab ID	Matrix	Date
18	HS-12SS-220119MS	22A0533-19MS	Sediment	01/19/22
19	HS-12SS-220119MSD	22A0533-19MSD	Sediment	01/19/22
20				
21				
22				

Notes:

	BKA0649-BLK1						

LDC#: 53481A3b

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG

METHOD: GC PCB (EPA SW 846 Method 8082)

Compound	Concentration (ug/Kg)		RPD (≤50%)	Difference (ug/Kg)	Limits (±2XRL)
	12	13			
Aroclor 1254	18.0	22.1		4	≤40
Aroclor 1260	24.3	18.7		6	≤40

V:\Josephine\FIELD DUPLICATES\53481A3b anchor port of bellingham diff.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: March 24, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22A0533

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
HS-1005SG-0-12-220119	22A0533-09	Sediment	01/19/22
HS-05SG-0-12-220119	22A0533-10	Sediment	01/19/22
HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22
HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
HS-08SS-220118	22A0533-15	Sediment	01/18/22
HS-10SS-220118	22A0533-17	Sediment	01/18/22
HS-11SS-220118	22A0533-18	Sediment	01/18/22
HS-12SS-220119	22A0533-19	Sediment	01/19/22
HS-01SG-0-12-220118MS	22A0533-01MS	Sediment	01/18/22
HS-01SG-0-12-220118DUP	22A0533-01DUP	Sediment	01/18/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Arsenic, Cadmium, Copper, and Zinc by Environmental Protection Agency (EPA) SW 846 Method 6010D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Instrument Calibration

Initial and continuing calibrations were performed as required by the method.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

III. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
HS-01SG-0-12-220118MS (All samples in SDG 22A0533)	Zinc	26.5 (70-130)	J (all detects)	A

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
HS-01SG-0-12-220118DUP (All samples in SDG 22A0533)	Copper Zinc	32.8 (≤30) 43.4 (≤30)	- -	J (all detects) J (all detects)	A

VIII. Serial Dilution

Serial dilution was not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples HS-1005SG-0-12-220119 and HS-05SG-0-12-220119 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)
	HS-1005SG-0-12-220119	HS-05SG-0-12-220119		
Arsenic	4.99	2.57	-	2.42 (≤55.8)
Cadmium	1.32	1.42	-	0.1 (≤2.24)
Copper	44.9	31.1	36 (≤50)	-
Zinc	65.2	67.9	4 (≤50)	-

XI. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to MS %R and DUP RPD, data were qualified as estimated in seventeen samples.

Port of Bellingham
Metals - Data Qualification Summary - SDG 22A0533

Sample	Analyte	Flag	A or P	Reason
HS-01SG-0-12-220118 HS-01SG-12-18-220118 HS-02SG-0-12-220118 HS-02SG-12-17-220118 HS-03SG-0-12-220118 HS-03SG-12-17-220118 HS-04SG-0-12-220119 HS-04SG-12-16-220119 HS-1005SG-0-12-220119 HS-05SG-0-12-220119 HS-05SG-12-16-220119 HS-06SG-0-12-220119 HS-06SG-12-17-220119 HS-08SS-220118 HS-10SS-220118 HS-11SS-220118 HS-12SS-220119	Zinc	J (all detects)	A	Matrix spike (%R)
HS-01SG-0-12-220118 HS-01SG-12-18-220118 HS-02SG-0-12-220118 HS-02SG-12-17-220118 HS-03SG-0-12-220118 HS-03SG-12-17-220118 HS-04SG-0-12-220119 HS-04SG-12-16-220119 HS-1005SG-0-12-220119 HS-05SG-0-12-220119 HS-05SG-12-16-220119 HS-06SG-0-12-220119 HS-06SG-12-17-220119 HS-08SS-220118 HS-10SS-220118 HS-11SS-220118 HS-12SS-220119	Copper Zinc	J (all detects) J (all detects)	A	Duplicate sample analysis (RPD)

Port of Bellingham
Metals - Laboratory Blank Data Qualification Summary - SDG 22A0533

No Sample Data Qualified in this SDG

LDC #: 53481A4b
SDG #: 22A0533
Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 3/16/22
Page: 1 of 2
Reviewer: a
2nd Reviewer: KK

METHOD: Metals (EPA SW-846 Method 6010D)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A HA	
II.	Instrument Calibration	A	
III.	ICP Interference Check Sample (ICS) Analysis	A	
IV.	Laboratory Blanks	A	
V.	Field Blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	SW	
VII.	Duplicate sample analysis	SW	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS
X.	Field Duplicates	SW	(9,10)
XI.	Target Analyte Quantitation	N	
XII	Overall Assessment of Data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
2	HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
3	HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
4	HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
5	HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
6	HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
7	HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
8	HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
9	HS-1005SG-0-12-220119	22A0533-09	Sediment	01/19/22
10	HS-05SG-0-12-220119	22A0533-10	Sediment	01/19/22
11	HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22
12	HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
13	HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
14	HS-08SS-220118	22A0533-15	Sediment	01/18/22
15	HS-10SS-220118	22A0533-17	Sediment	01/18/22
16	HS-11SS-220118	22A0533-18	Sediment	01/18/22
17	HS-12SS-220119	22A0533-19	Sediment	01/19/22

LDC #: 53481A4b

SDG #: 22A0533

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 3/16/22

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: Metals (EPA SW-846 Method 6010D)

	Client ID	Lab ID	Matrix	Date
18	HS-01SG-0-12-220118MS	22A0533-01MS	Sediment	01/18/22
19	HS-01SG-0-12-220118DUP	22A0533-01DUP	Sediment	01/18/22
20				
21				
22				

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
All	As, Cd, Cu, Zn

Analysis Method

ICP	As, Cd, Cu, Zn
ICP-MS	
CVAA	

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

MS analysis was performed by the laboratory. All MS percent recoveries (%R) were within the acceptable limits with the following exceptions:

MS ID	Matrix	Analyte	MS %R	%R Limit	Associated Samples	Qualification	Det/ND
18	s	Zn	26.5	70-130	All	J/R/A	Det

Comments:

Laboratory Duplicates

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)

Laboratory duplicate analysis was performed by the laboratory. All laboratory duplicates were with the relative percent difference (RPD) for samples >5X the reporting limits with the exceptions listed below. If samples were <5X the reporting limits, the difference was within 1X the reporting limit for water samples and within 2X the reporting limit for soil samples for all samples with the exceptions listed below.

Duplicate ID	Matrix	Analyte	RPD	RPD Limit	Difference (units)	Difference Limit	Associated Samples	Qualification	Det/ND
19	s	Cu	32.8	30			All	J/UJ/A	Det
		Zn	43.4	30			All	J/UJ/A	Det

Comments:

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Method: Metals

Analyte	Concentration (mg/Kg)		RPD (≤ 50)	Diff.	Diff. Limits
	9	10			
Arsenic	4.99	2.57		2.42	(≤55.8)
Cadmium	1.32	1.42		0.1	(≤2.24)
Copper	44.9	31.1	36		
Zinc	65.2	67.9	4		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: March 24, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22A0533

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
HS-1005SG-0-12-220119	22A0533-09	Sediment	01/19/22
HS-05SG-0-12-220119	22A0533-10	Sediment	01/19/22
HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22
HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
HS-08SS-220118	22A0533-15	Sediment	01/18/22
HS-10SS-220118	22A0533-17	Sediment	01/18/22
HS-11SS-220118	22A0533-18	Sediment	01/18/22
HS-12SS-220119	22A0533-19	Sediment	01/19/22
HS-01SG-0-12-220118MS	22A0533-01MS	Sediment	01/18/22
HS-01SG-0-12-220118DUP1	22A0533-01DUP1	Sediment	01/18/22
HS-01SG-0-12-220118DUP2	22A0533-01DUP2	Sediment	01/18/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A
Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples HS-1005SG-0-12-220119 and HS-05SG-0-12-220119 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)
	HS-1005SG-0-12-220119	HS-05SG-0-12-220119		
Total solids	44.95	42.97	5 (≤50)	-
Total organic carbon	1.38	1.57	13 (≤50)	-

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Port of Bellingham
Wet Chemistry - Data Qualification Summary - SDG 22A0533

No Sample Data Qualified in this SDG

Port of Bellingham
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22A0533

No Sample Data Qualified in this SDG

LDC #: 53481A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 3/16/22
SDG #: 22A0533 Stage 2B Page: 1 of 2
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer:
2nd Reviewer:

METHOD: (Analyte) TOC (EPA SW-846 Method 9060A), Total Solids (SM2540G)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A,A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	
VII.	Duplicate sample analysis	A	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	(9,10)
X.	Target Analyte Quantitation	N	
XI	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-01SG-0-12-220118	22A0533-01	Sediment	01/18/22
2	HS-01SG-12-18-220118	22A0533-02	Sediment	01/18/22
3	HS-02SG-0-12-220118	22A0533-03	Sediment	01/18/22
4	HS-02SG-12-17-220118	22A0533-04	Sediment	01/18/22
5	HS-03SG-0-12-220118	22A0533-05	Sediment	01/18/22
6	HS-03SG-12-17-220118	22A0533-06	Sediment	01/18/22
7	HS-04SG-0-12-220119	22A0533-07	Sediment	01/19/22
8	HS-04SG-12-16-220119	22A0533-08	Sediment	01/19/22
9	HS-1005SG-0-12-220119	22A0533-09	Sediment	01/19/22
10	HS-05SG-0-12-220119	22A0533-10	Sediment	01/19/22
11	HS-05SG-12-16-220119	22A0533-11	Sediment	01/19/22
12	HS-06SG-0-12-220119	22A0533-12	Sediment	01/19/22
13	HS-06SG-12-17-220119	22A0533-13	Sediment	01/19/22
14	HS-08SS-220118	22A0533-15	Sediment	01/18/22
15	HS-10SS-220118	22A0533-17	Sediment	01/18/22
16	HS-11SS-220118	22A0533-18	Sediment	01/18/22
17	HS-12SS-220119	22A0533-19	Sediment	01/19/22

LDC #: 53481A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 3/16/22
SDG #: 22A0533 Stage 2B Page: 2 of 2
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer:
2nd Reviewer:

METHOD: (Analyte) TOC (EPA SW-846 Method 9060A), Total Solids (SM2540G)

	Client ID	Lab ID	Matrix	Date
18	HS-01SG-0-12-220118MS	22A0533-01MS	Sediment	01/18/22
19	HS-01SG-0-12-220118DUP	22A0533-01DUP	Sediment	01/18/22
20	HS-01SG-0-12-220118~~TRP~~ DUP	22A0533-01~~TRP~~ DUP	Sediment	01/18/22
21				
22				
23				

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
All	TS, TOC
QC	
18	TOC
19	TOC, TS
20	TS

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Method: Inorganics

Analyte	Concentration (mg/Kg)		RPD (≤ 50)	Diff.	Diff. Limits
	9	10			
Total solids	44.95	42.97	5		
TOC	1.38	1.57	13		

LDC #: 53481

EDD POPULATION COMPLETENESS WORKSHEET

Anchor

Date: 3-28-2

Page: 1 of 1

2nd Reviewer: _____

The LDC job number listed above was entered by WH.

	EDD Process	Y/N	Initial	Comments/Action
I.	EDD Completeness	-		
Ia.	- All methods present?	Y	WH	
Ib.	- All samples present/match report?	Y	WH	
Ic.	- All reported analytes present?	Y	WH	
Id.	- 10% or 100% verification of EDD?	Y	WH	10%
II.	EDD Preparation/Entry	-		
IIa.	- QC Level applied? (EPAStage2B or EPAStage4)	Y	WH	EPAStage2B
IIb.	- Laboratory EMPC qualified results qualified (J with reason code 23)?	NA	WH	
III.	Reasonableness Checks	-		
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	Y	WH	
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	Y	WH	
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	Y	WH	
IIId.	- Do blank concentrations in report match EDD, where data was qualified due to blank?	NA	WH	
IIIe.	- Is the detect flag set to "N" for all "U" qualified blank results?	NA	WH	
IIIf.	- Were there multiple results due to dilutions/reanalysis? If so, were results qualified appropriately?	Y/Y	WH	
IIIg.	-Are all results marked reportable "Yes" unless rejected for overall assessment in the data validation report?	Y	WH	
IIIh.	-Are there any lab "R" qualified data? / Are the entry columns blank for these results?	NA	WH	
IIIi.	-Are there any discrepancies between the data packet and the EDD?	N	WH	

Notes: *see discrepancy sheet

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

May 27, 2022

SUBJECT: Port of Bellingham, Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on April 1, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #53881:

SDG #	Fraction
22C0093	Polynuclear Aromatic Hydrocarbons, Polychlorinated Biphenyls, Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020).
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Kevin Kha
kkha@lab-data.com
Project Manager/Senior Chemist

12 pages-ADV R1 (added wet chem) Attachment 1

Stage 2B EDD

LDC# 53881 (Anchor Environmental - Seattle, WA / Port of Bellingham)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270E)		PCBs (8082A)		(4) Metals (6010D)		TOC (9060A)		Total Solids (2540G)																									
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	22C0093	04/01/22	04/22/22	0	2	0	1	0	1	0	1	0	1																								
Total	T/KK			0	2	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: May 19, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22C0093

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-09SS-220118	22C0093-01	Sediment	01/18/22
HS-09SS-220118DUP	22C0093-01DUP	Sediment	01/18/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A
Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

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

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
HS-09SS-220118	Total organic carbon	79 days	14 days	J (all detects)	P

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to technical holding time, data were qualified as estimated in one sample.

Port of Bellingham
Wet Chemistry - Data Qualification Summary - SDG 22C0093

Sample	Analyte	Flag	A or P	Reason
HS-09SS-220118	Total organic carbon	J (all detects)	P	Technical holding times

Port of Bellingham
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22C0093

No Sample Data Qualified in this SDG

LDC #: 53881A6
SDG #: 22C0093
Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 6/12/22
Page: 1 of 1
Reviewer: JM
2nd Reviewer: JLR

METHOD: (Analyte) TOC (EPA SW-846 Method 9060A), Total Solids (SM2540G)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / SW	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	
VII.	Duplicate sample analysis	A	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Target Analyte Quantitation	N	
XI	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-09SS-220118	22C0093-01	Sediment	01/18/22
2	HS-09SS-220118DUP	22C0093-01DUP	Sediment	01/18/22
3				
4				
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15				

Notes:

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	TOC,Total Solids
QC:	
2	Total Solids

Holding Time

METHOD: Inorganics

All samples were properly preserved and within the requried holding time with the following exceptions.

		Method: 9060A Analyte: Total Organic Carbon Holding Time: 14 days			
Sample ID	**Sampling Date**	**Analysis Date**	**Total Time from Collection to Analysis**	**Qualifier**	**Det/ND**
1	1/18/2022	4/7/2022	79	J/R/P	Det

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: May 19, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22C0093

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-09SS-220118	22C0093-01	Sediment	01/18/22
HS-09SS-220118DL	22C0093-01DL	Sediment	01/18/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270E

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

Instrument performance check was performed at the required frequency.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
03/22/22	Fluoranthene Pyrene	83.1 38.9	HS-09SS-220118	J (all detects) J (all detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

Samples DRET-HS-COMP-A-220120 and DRET-HS-COMP-A1-220120 were identified as field duplicates. No results were detected in any of the samples.

XI. Internal Standards

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

XII. Target Analyte Quantitation

All target analyte quantitations met validation criteria with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
HS-09SS-220118	Fluoranthene Pyrene Chrysene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Analyte	Reason	Flag	A or P
HS-09SS-220118	Fluoranthene Pyrene Chrysene	Results exceeded calibration range.	Not reportable	-
HS-09SS-220118DL	All analytes except Fluoranthene Pyrene Chrysene	Results from undiluted analyses were more usable.	Not reportable	-

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 22C0093

Sample	Analyte	Flag	A or P	Reason
HS-09SS-220118	Fluoranthene Pyrene Chrysene	Not reportable	-	Overall assessment of data
HS-09SS-220118DL	All analytes except Fluoranthene Pyrene Chrysene	Not reportable	-	Overall assessment of data

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 22C0093

No Sample Data Qualified in this SDG

LDC #: 53881A2a

SDG #: 22C0093

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 05/10/22

Page: 1 of 1

Reviewer: SW

2nd Reviewer: DC

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	RSD ≤ 20% ICV ≤ 30%
IV.	Continuing calibration	SW	%D ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	A	LCS/D
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	SW	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	

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

	Client ID	Lab ID	Matrix	Date
1	HS-09SS-220118	22C0093-01	Sediment	01/18/22
2	HS-09SS-220118DL	22C0093-01DL	Sediment	01/18/22
3				
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Notes:

	BKC0240-BLK1						

(Frozen sample)

LDC #: 53881 A2b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG

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

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

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

Y (N) N/A Were percent differences (%D) ≤20 % and relative response factors (RRF) within the method criteria?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit)	Associated Samples	Qualifications
	03/22/22	NT1022032209	YY (+)	83.1		1 (Det)	J dets/A
			ZZ (+)	38.9		↓* ↓	↓

Note: * Ave RRF failed method criteria but within validation criteria

LDC #: 53881A2a

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported RLs

Reviewer: JVG

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

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

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Sample ID	Compound	Finding	Qualifications
	1	YY, ZZ, DDD	> cal range	J dets/A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 53881A2a

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVG

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.
(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Compound	Finding	Qualifications
		1	YY, ZZ, DDD	> cal range	NR / A
		2	All except above	dil	1

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: May 19, 2022

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22C0093

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-09SS-220118	22C0093-01	Sediment	01/18/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Flag	A or P
03/10/22	SKC0142-SCV1	2C	Aroclor-1260	20.8	HS-09SS-220118	J (all detects)	A

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV %D, data were qualified as estimated in one sample.

Port of Bellingham
Polychlorinated Biphenyls - Data Qualification Summary - SDG 22C0093

Sample	Analyte	Flag	A or P	Reason
HS-09SS-220118	Aroclor-1260	J (all detects)	A	Initial calibration verification (%D)

Port of Bellingham
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG 22C0093

No Sample Data Qualified in this SDG

LDC #: 53881A3b
SDG #: 22C0093
Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 05/10/22
Page: 1 of 1
Reviewer: VV
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/SW	ICV ≤ 20%
III.	Continuing calibration	A	%D ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-09SS-220118	22C0093-01	Sediment	01/18/22
2				
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Notes:

	BKC0281 - BLK1						

(Frozen Sample)

LDC #: 53881A36

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: JVG

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ✓ %D or ___ %R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
	03/10/22	SKC0142-SCV1	2C	Aroclor 1260	20.8	All (Det)	J dets /A

(ICV performed on all PCBs)

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: May 19, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22C0093

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-09SS-220118	22C0093-01	Sediment	01/18/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Arsenic, Cadmium, Copper, and Zinc by Environmental Protection Agency (EPA) SW 846 Method 6010D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Instrument Calibration

Initial and continuing calibrations were performed as required by the method.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

III. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

VIII. Serial Dilution

Serial dilution was not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Metals - Data Qualification Summary - SDG 22C0093

No Sample Data Qualified in this SDG

Port of Bellingham
Metals - Laboratory Blank Data Qualification Summary - SDG 22C0093

No Sample Data Qualified in this SDG

LDC #: 53881A4b
SDG #: 22C0093
Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 5/12/22
Page: 1 of 1
Reviewer: JM
2nd Reviewer: ITK

METHOD: Metals (EPA SW-846 Method 6010D)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Instrument Calibration	A	
III.	ICP Interference Check Sample (ICS) Analysis	A	
IV.	Laboratory Blanks	A	
V.	Field Blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	
VII.	Duplicate sample analysis	N	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS
X.	Field Duplicates	N	
XI.	Target Analyte Quantitation	N	
XII.	Overall Assessment of Data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-09SS-220118	22C0093-01	Sediment	01/18/22
2				
3				
4				
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16				

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	As,Cd,Cu,Zn

Analysis Method

ICP	As,Cd,Cu,Zn
ICP-MS	
CVAA	

LDC #: 53881

EDD POPULATION COMPLETENESS WORKSHEET

Anchor

Date: 5/27/22

2nd Reviewer: _____

The LDC job number listed above was entered by WH.

	EDD Process	Y/N	Initial	Comments/Action
I.	EDD Completeness	-		
Ia.	- All methods present?	Y	WH	
Ib.	- All samples present/match report?	Y	WH	
Ic.	- All reported analytes present?	Y	WH	
Id.	- 10% or 100% verification of EDD?	Y	WH	10%
II.	EDD Preparation/Entry	-		
IIa.	- QC Level applied? (EPAStage2B or EPAStage4)	Y	WH	EPAStage 2B
IIb.	- Laboratory EMPC qualified results qualified (J with reason code 23)?	NA	WH	
III.	Reasonableness Checks	-		
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	Y	WH	
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	Y	WH	
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	Y	WH	
IIId.	- Do blank concentrations in report match EDD, where data was qualified due to blank?	NA	WH	
IIIe.	- Is the detect flag set to "N" for all "U" qualified blank results?	NA	WH	
IIIf.	- Were there multiple results due to dilutions/reanalysis? If so, were results qualified appropriately?	Y/Y	WH	
IIIg.	-Are all results marked reportable "Yes" unless rejected for overall assessment in the data validation report?	N	WH	method 8082A
IIIh.	-Are there any lab "R" qualified data? / Are the entry columns blank for these results?	NA	WH	
IIIi.	-Are there any discrepancies between the data packet and the EDD?	N	WH	

Notes: *see discrepancy sheet

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

September 6, 2022

SUBJECT: Port of Bellingham - Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on June 8, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #54461_RV1:

SDG #	Fraction
22D0380	Polynuclear Aromatic Hydrocarbons,Polychlorinated Biphenyls, Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Stella Cuenco
scuenco@lab-data.com
Project Manager/Senior Chemist

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

August 22, 2022

SUBJECT: Port of Bellingham - Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on June 8, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #54461:

SDG #	Fraction
22D0380	Polynuclear Aromatic Hydrocarbons,Polychlorinated Biphenyls, Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Stella Cuenco
scuenco@lab-data.com
Project Manager/Senior Chemist

Stage 2B EDD **LDC# 54461 (Anchor Environmental - Seattle, WA / Harris Ave. Shipyard, Port of Bellingham)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270E)		PCBs (8082A)		(5) Metals (6010D)		7 TCLP Metals (6010D)		TCLP Hg (7470A)		TOC (9060A)		Total Solids (2540G)																					
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	22D0380	06/08/22	06/29/22	0	1	0	1	0	1	0	2	0	2	0	1	0	1																		
Total	T/KK			0	1	0	1	0	1	0	2	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: July 28, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22D0380

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270E

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

Instrument performance check was performed at the required frequency.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples/Standard Reference Materials

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

Standard reference materials (SRM) were analyzed as required by the method. The results were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 22D0380

No Sample Data Qualified in this SDG

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 22D0380

No Sample Data Qualified in this SDG

LDC #: 54461A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 7/21/22
SDG #: 22D0380 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer: EJ
2nd Reviewer: [signature]

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	% RSD ≤20 ICV ≤ 30
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples / SRM	A/A	LCS, SRM
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22
2				
3				
4				
5				
6				
7				
8				
9				

Notes:

	BKE0004-BLK1						

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: July 28, 2022

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22D0380

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Flag	A or P
04/15/22	ICV	Col1 Col2	Aroclor-1260 Aroclor-1260	25.1 30.9	All samples in SDG 22D0380	NA	-

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Affected Analytes	Flag	A or P
05/25/22	CCV4	Col2	Aroclor-1260	23.5	All samples in SDG 22D0380	Aroclor-1254 Aroclor-1260 Aroclor-1262 Aroclor-1268	NA	-

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Port of Bellingham
Polychlorinated Biphenyls - Data Qualification Summary - SDG 22D0380

No Sample Data Qualified in this SDG

Port of Bellingham
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG 22D0380

No Sample Data Qualified in this SDG

LDC #: 54461A3b
SDG #: 22D0380
Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 7/21/22
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A / SW	%D PSD / ICV ≤ 20
III.	Continuing calibration	SW	CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	05
VIII.	Laboratory control samples	A	LCS ID
IX.	Field duplicates	N	
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Notes:

	BKE0008-BLK1						

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II. Aroclor 1262
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ. Aroclor 1268
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. 2,4'-DDD	KK. Oxychlordane
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL. trans-Nonachlor
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM. cis-Nonachlor
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:_____

LDC #: 54461A3b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Page: 1 of 1
Reviewer: FT

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? ___%D or ___%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
	4/15/22	ICV	CC01	BB	25.1	All	Idw/A qual BB (ND)
	0241		CC02	BB	30.9	↓	↓ ↓

ICV-gc.wpd

LDC #: 54461A3b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT

METHOD: (GC) HPLC GCMS

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

(Y) N N/A Were continuing calibration standards analyzed at the required frequencies?
Y (N) N/A Did the continuing calibration standards meet the %D / %R validation criteria?
Level IV Only
Y N N/A Were the retention times for all calibrated analytes within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D ≤ 20	RT (limit)	Associated Samples	Qualifications
	5/25/22 1924	CC#4	col 2	BB	23.5		All	J (all) /A All ND qual AA, BB, Aroclor 1262 Aroclor 1268

LDC #: 54461 A3D

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Reviewer: FT

METHOD: ✓ **GC** ___ **HPLC**

Are surrogates required by the method? Yes___ or No___.

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

Y N N/A Were surrogates spiked into all samples and blanks?

Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	BKE0008-BLK1	col 2	Y	52.6 (53-120)	J/UJ/P
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	
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				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	2-Bromonaphthalene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin	AA	Chloro-octadecane
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin	BB	2,4-Dichlorophenylacetic acid
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate	CC	2,5-Dibromotoluene
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: September 6, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22D0380

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-01HA-0-1-220419(TCLP)	22D0380-01(TCLP)	Sediment	04/19/22
HS-01HA-1-2-220419(TCLP)	22D0380-02(TCLP)	Sediment	04/19/22
HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22
HS-01HA-0-1-220419(TCLP)MS	22D0380-01(TCLP)MS	Sediment	04/19/22
HS-01HA-0-1-220419(TCLP)DUP	22D0380-01(TCLP)DUP	Sediment	04/19/22

Samples appended with "TCLP" underwent Toxicity Characteristic Leaching Procedure (TCLP) extraction

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Selenium, Silver and Zinc by Environmental Protection Agency (EPA) SW 846 Method 6010D
Mercury by EPA SW 846 Method 7470A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

III. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Cadmium Chromium Barium Zinc	0.0042 mg/L 0.0114 mg/L 0.0689 mg/L 0.0221 mg/L	HS-01HA-0-1-220419(TCLP) HS-01HA-1-2-220419(TCLP)
ICB/CCB	Arsenic Cobalt	0.005 mg/L 0.0006 mg/L	HS-02HA-0-0.39-220419
ICB/CCB	Cadmium Selenium Chromium	0.0009 mg/L 0.0086 mg/L 0.0036 mg/L	HS-01HA-0-1-220419(TCLP) HS-01HA-1-2-220419(TCLP)
ICB/CCB	Barium	0.0021 mg/L	HS-01HA-0-1-220419(TCLP)

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
HS-01HA-0-1-220419(TCLP)	Cadmium Barium Zinc Selenium	0.002 mg/L 0.203 mg/L 0.0969 mg/L 0.173 mg/L	0.010U mg/L 0.203U mg/L 0.0969U mg/L 0.250U mg/L
HS-01HA-1-2-220419(TCLP)	Cadmium Barium	0.0043 mg/L 0.0978 mg/L	0.010U mg/L 0.0978U mg/L

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Serial Dilution

Serial dilution was not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

Port of Bellingham
Metals - Data Qualification Summary - SDG 22D0380

No Sample Data Qualified in this SDG

Port of Bellingham
Metals - Laboratory Blank Data Qualification Summary - SDG 22D0380

Sample	Analyte	Modified Final Concentration	A or P
HS-01HA-0-1-220419(TCLP)	Cadmium Barium Zinc Selenium	0.010U mg/L 0.203U mg/L 0.0969U mg/L 0.250U mg/L	A
HS-01HA-1-2-220419(TCLP)	Cadmium Barium	0.010U mg/L 0.0978U mg/L	A

LDC #: 54461A4b

SDG #: 22D0380

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 8/11/22

Page: 1 of 1

Reviewer: JM

2nd Reviewer: AC

METHOD: Metals (EPA SW-846 Method 6010D/7470A)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Instrument Calibration	A	
III.	ICP Interference Check Sample (ICS) Analysis	A	
IV.	Laboratory Blanks	SW	
V.	Field Blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS
VII.	Duplicate sample analysis	A	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS
X.	Field Duplicates	N	
XI.	Target Analyte Quantitation	N	
XII.	Overall Assessment of Data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-01HA-0-1-220419(TCLP)	22D0380-01(TCLP)	Sediment	04/19/22
2	HS-01HA-1-2-220419(TCLP)	22D0380-02(TCLP)	Sediment	04/19/22
3	HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22
4	HS-01HA-0-1-220419(TCLP)MS	22D0380-01(TCLP)MS	Sediment	04/19/22
5	HS-01HA-0-1-220419(TCLP)DUP	22D0380-01(TCLP)DUP	Sediment	04/19/22
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Notes:

Sample Specific Element Reference Reviewer: Jada Morales

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1-3	As,Cd,Cu,Zn
1-2	Ba,Cr,Pb,Se,Ag,Hg
3	Co
QC:	
4-5	As,Ba,Cd,Cr,Co,Cu,Pb,Se,Ag,Zn,Hg

Analysis Method

ICP	As,Ba,Cd,Cr,Co,Cu,Pb,Se,Ag,Zn
ICP-MS	
CVAA	Hg

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

Reviewer: Jada Morales

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/L Associated Samples: 1-2

				Sample Identification								
Analyte	**PB (mg/L)**	**Maximum ICB/CCB (units)**	**Action Level**	1	2							
Cd	0.0042		0.021	0.002/0.010	0.0043/0.010							
Cr	0.0114		0.057									
Ba	0.0689		0.3445	0.203	0.0978							
Zn	0.0221		0.1105	0.0969								

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50

Sample Concentration, unless otherwise noted: mg/Kg Associated Samples: 3

				Sample Identification								
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level**	No Qual								
As		0.005										
Co		0.0006										

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50

Sample Concentration, unless otherwise noted: mg/L

Associated Samples: 1-2

				Sample Identification								
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level**	1	2							
Cd		0.0009		0.002/0.010	0.0043/0.010							
Se		0.0086		0.173/0.250								
Cr		0.0036										

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable): 50

Sample Concentration, unless otherwise noted: mg/L

Associated Samples: 1

				Sample Identification								
Analyte	**PB (units)**	**Maximum ICB/CCB (mg/L)**	**Action Level**	1								
Ba		0.0021		0.203								

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: August 12, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22D0380

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A
Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples/Standard Reference Materials

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

Standard reference materials (SRM) were analyzed as required by the methods. The results were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Port of Bellingham
Wet Chemistry - Data Qualification Summary - SDG 22D0380

No Sample Data Qualified in this SDG

Port of Bellingham
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22D0380

No Sample Data Qualified in this SDG

LDC #: 54461A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/11/22
SDG #: 22D0380 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer: JM
2nd Reviewer:

METHOD: (Analyte) TOC (EPA SW-846 Method 9060A), Total Solids (SM2540G)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	
VII.	Duplicate sample analysis	N	
VIII.	Laboratory control samples	A	LCS/SRM
IX.	Field duplicates	N	
X.	Target Analyte Quantitation	N	
XI	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-02HA-0-0.39-220419	22D0380-03	Sediment	04/19/22
2				
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15				

Notes:

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

October 5, 2022

SUBJECT: Port of Bellingham - Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on August 18, 2022. Attachment 1 is a summary of the samples that were reviewed for each analysis.

Revision: PAH
Added qualifiers due to cooler temperature and LCS/LCSD %R

PCB
Added a qualifier due to RPD between two colums for sample HS-13SS-0-12-220621

LDC Project #54841_RV1:

SDG #	Fraction
22F0420	Polynuclear Aromatic Hydrocarbons,Polychlorinated Biphenyls, Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021)
- USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020)
- USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020)
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014; update VI, July 2018

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

Sincerely,

Stella Cuenco
scuenco@lab-data.com
Project Manager/Senior Chemist

330 pages-ADV

Attachment 1

Stage 2B EDD **LDC# 54841 (Anchor Environmental - Seattle, WA / Harris Ave. Shipyard, Port of Bellingham)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270E)		PCBs (8082A)		(3) Metals (6010D)		TOC (9060A)		Total Solids (2540G)																							
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	22F0420	08/18/22	09/09/22	0	2	0	2	0	2	0	2	0	2																						
Total	TR/KK			0	2	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

V:\LOGIN\Anchor\Port of Bellingham_Harris\54841ST.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: October 5, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22F0420

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270E

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 22F0420	All analytes	Cooler temperature was reported at 10.9°C upon receipt by the laboratory.	Cooler temperature must be 4±2°C.	J (all detects)	A

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

Instrument performance check was performed at the required frequency.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
07/07/22	Fluoranthene Pyrene	83.7 49.4	All samples in SDG 22F0420	J (all detects) J (all detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate Surrogates were added to all samples as required by the method. Surrogate recoveries (%R) were not within QC limits for sample HS-13SS-0-12-220621. Using professional judgment, no data were qualified when one surrogate %R was outside the QC limits and the %R was greater than or equal to 10%.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Flag	A or P
BKF0667-LCS/LCSD (All samples in SDG 22F0420)	Benzo(g,h,i)perylene	45.8 (50-150)	49.7 (50-150)	J (all detects)	P

Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to cooler temperature, continuing calibration %D, and LCS/LCSD %R, data were qualified as estimated in two samples.

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 22F0420

Sample	Analyte	Flag	A or P	Reason
HS-13SS-0-12-220621 HS-14SS-0-12-220621	All analytes	J (all detects)	A	Cooler temperature
HS-13SS-0-12-220621 HS-14SS-0-12-220621	Fluoranthene Pyrene	J (all detects) J (all detects)	A	Continuing calibration (%D)
HS-13SS-0-12-220621 HS-14SS-0-12-220621	Benzo(g,h,i)perylene	J (all detects)	P	Laboratory control samples (%R)

Port of Bellingham
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 22F0420

No Sample Data Qualified in this SDG

LDC #: 54841A2a

VALIDATION COMPLETENESS WORKSHEET

SDG #: 22F0420

Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Date: 8/31/22

Page: 1 of 1

Reviewer: EJ

2nd Reviewer: AC

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	%D/RSD ≤20 ICV ≤30
IV.	Continuing calibration	SW	CCV ≤20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	SW	LCS ID
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
2	HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22
3				
4				
5				
6				
7				
8				
9				

Notes:

	BKF0667						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	CC. Dimethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	GGGG. C30-Hopane	I1. Methyl methanesulfonate
B. Bis (2-chloroethyl) ether	DD. Acenaphthylene	FFF. Di-n-octylphthalate	HHHH. 1-Methylphenanthrene	J1. Ethyl methanesulfonate
C. 2-Chlorophenol	EE. 2,6-Dinitrotoluene	GGG. Benzo(b)fluoranthene	IIII. 1,4-Dioxane	K1. o,o',o''-Triethylphosphorothioate
D. 1,3-Dichlorobenzene	FF. 3-Nitroaniline	HHH. Benzo(k)fluoranthene	JJJJ. Acetophenone	L1. n-Phenylene diamine
E. 1,4-Dichlorobenzene	GG. Acenaphthene	III. Benzo(a)pyrene	KKKK. Atrazine	M1. 1,4-Naphthoquinone
F. 1,2-Dichlorobenzene	HH. 2,4-Dinitrophenol	JJJ. Indeno(1,2,3-cd)pyrene	LLLL. Benzaldehyde	N1. N-Nitro-o-toluidine
G. 2-Methylphenol	II. 4-Nitrophenol	KKK. Dibenz(a,h)anthracene	MMMM. Caprolactam	O1. 1,3,5-Trinitrobenzene
H. 2,2'-Oxybis(1-chloropropane)	JJ. Dibenzofuran	LLL. Benzo(g,h,i)perylene	NNNN. 2,6-Dichlorophenol	P1. Pentachlorobenzene
I. 4-Methylphenol	KK. 2,4-Dinitrotoluene	MMM. Bis(2-Chloroisopropyl)ether	OOOO. 1,2-Diphenylhydrazine	Q1. 4-Aminobiphenyl
J. N-Nitroso-di-n-propylamine	LL. Diethylphthalate	NNN. Aniline	PPPP. 3-Methylphenol	R1. 2-Naphthylamine
K. Hexachloroethane	MM. 4-Chlorophenyl-phenyl ether	OOO. N-Nitrosodimethylamine	QQQQ. 3&4-Methylphenol	S1. Triphenylene
L. Nitrobenzene	NN. Fluorene	PPP. Benzoic Acid	RRRR. 4-Dimethyldibenzothiophene (4MDT)	T1. Octachlorostyrene
M. Isophorone	OO. 4-Nitroaniline	QQQ. Benzyl alcohol	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	U1. Famphur
N. 2-Nitrophenol	PP. 4,6-Dinitro-2-methylphenol	RRR. Pyridine	TTTT. 1-Methyldibenzothiophene (1MDT)	V1. 1,4-phenylenediamine
O. 2,4-Dimethylphenol	QQ. N-Nitrosodiphenylamine	SSS. Benzidine	UUUU.. 2,3,4,6-Tetrachlorophenol	W1. Methapyrilene
P. Bis(2-chloroethoxy)methane	RR. 4-Bromophenyl-phenylether	TTT. 1-Methylnaphthalene	VVVV. 1,2,4,5-Tetrachlorobenzene	X1. Pentachloroethane
Q. 2,4-Dichlorophenol	SS. Hexachlorobenzene	UUU.Benzo(b)thiophene	WWWW.. 2-Picoline	Y1. 3,3'-Dimethylbenzidine
R. 1,2,4-Trichlorobenzene	TT. Pentachlorophenol	VVV.Benzonaphthothiophene	XXXX. 3-Methylcholanthrene	Z1. o-Toluidine
S. Naphthalene	UU. Phenanthrene	WWW.Benzo(e)pyrene	YYYY. a,a-Dimethylphenethylamine	A2. 1-Naphthylamine
T. 4-Chloroaniline	VV. Anthracene	XXX. 2,6-Dimethylnaphthalene	ZZZZ. Hexachloropropene	B2. 4-Aminobiphenyl
U. Hexachlorobutadiene	WW. Carbazole	YYY. 2,3,5-Trimethylnaphthalene	A1. N-Nitrosodiethylamine	C2. 4-Nitroquinoline-1-oxide
V. 4-Chloro-3-methylphenol	XX. Di-n-butylphthalate	ZZZ. Perylene	B1. N-Nitrosodi-n-butylamine	D2. Hexachloropene
W. 2-Methylnaphthalene	YY. Fluoranthene	AAAA. Dibenzothiophene	C1. N-Nitrosomethylethylamine	E2. Bis (2-chloro-1-methylethyl) ether
X. Hexachlorocyclopentadiene	ZZ. Pyrene	BBBB. Benzo(a)fluoranthene	D1. N-Nitrosomorpholine	F2. Bifenthrin
Y. 2,4,6-Trichlorophenol	AAA. Butylbenzylphthalate	CCCC. Benzo(b)fluorene	E1. N-Nitrosopyrrolidine	G2. Cyfluthrin
Z. 2,4,5-Trichlorophenol	BBB. 3,3'-Dichlorobenzidine	DDDD. cis/trans-Decalin	F1. Phenacetin	H2. Cypermethrin
AA. 2-Chloronaphthalene	CCC. Benzo(a)anthracene	EEEE. 1,1'-Biphenyl	G1. 2-Acetylaminofluorene	I2. Permethrin (cis/trans)
BB. 2-Nitroaniline	*DDD. Chrysene*	*FFFF. Retene*	*H1. Pronamide*	J2. 5-Nitro-o-toluidine

LDC #: 54841 A3b

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer Reviewer: ↖

N Were all cooler temperatures within validation criteria?

METHOD : ___ **GC** ___ **HPLC** GCMS LCMS

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
All	cooler temp = 10.9°C					14	no qual J/4 D/1 all Det
		< 11°C no qual			F7		

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:	Water unpreserved:	Aromatic within 7 days, non-aromatic within 14 days of sample collection.
	Water preserved:	Both within 14 days of sample collection.
	Soils:	Both within 14 days of sample collection.
	Encores unpreserved:	Both within 48 hours of sample collection.
	Encores preserved:	Both within 14 days of sample collection.
EXTRACTABLES:		
	Water:	Extracted within 7 days, analyzed within 40 days.
	Soil:	Extracted within 14 days, analyzed within 40 days.

LDC #: 54841A2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT

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

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

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

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

Y N N/A Were all %D and RRFs within the validation criteria of ≤20%D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <20.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	7/7/22 1151	CCV	YY	83.7		All ↓	Jalt/A all Det
			ZZ	49.4			

LDC #: 54641A2a

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Page: 1 of 1

Reviewer: FT

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

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

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

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

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

#	Sample ID	Surrogate	%R (Limits)	Qualifications
	#1	TPH	122 (37-120)	no qual
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
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			( )	
			( )	
			( )	

(NBZ) = Nitrobenzene - d5
(FBP) = 2-Fluorobiphenyl
(TPH) = Terphenyl - d14
(2FP) = 2-Fluorophenol
(TBP) = 2,4,6 -Tribromophenol
(2CP) = 2-Chlorophenol - d4

LDC #: 54841A2a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: FT

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

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

[✓ Y] N N/A Was a LCS required?

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

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	BKF0667-LCS/D	LLL	45.8 (50-150)	49.7 (50-150)	( )	All	J/UJ/P (Det)
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

FT

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: October 5, 2022

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22F0420

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) by Environmental Protection Agency (EPA) SW 846 Method 8082A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

The chain-of-custodies were reviewed for documentation of cooler temperatures. Cooler temperatures were reported at 10.9°C upon receipt by the laboratory. No data was qualified based on cooler temperature.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Flag	A or P
04/15/22	ICV	ZB5	Aroclor-1260	25.1	All samples in SDG 22F0420	J (all detects)	A
04/15/22	ICV	ZB35	Aroclor-1260	30.9	All samples in SDG 22F0420	J (all detects)	A

III. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Standard	Column	Analyte	%D	Associated Samples	Affected Analyte	Flag	A or P
07/05/22	CCV3	ZB35	Aroclor-1242	32.7	All samples in SDG 22F0420	Aroclor-1242	NA	-
07/06/22	CCV6	ZB35	Aroclor-1260	57.5	All samples in SDG 22F0420	Aroclor-1260 Aroclor-1262 Aroclor-1268	J (all detects) J (all detects) J (all detects)	A

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates/Internal Standards

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

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Affected Analyte	Flag	A or P
BKF0674-LCS/LCSD (All samples in SDG 22F0420)	Aroclor-1260	157 (50-150)	154 (50-150)	Aroclor-1254 Aroclor-1260	J (all detects) J (all detects)	A
BKF0674-LCS/LCSD (All samples in SDG 22F0420)	Aroclor-1260	157 (50-150)	154 (50-150)	Aroclor-1248 Aroclor-1262 Aroclor-1268	NA	-

Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

The sample results for detected analytes from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Analyte	RPD	Flag	A or P
HS-13SS-0-12-220621	Aroclor-1260	90.8	J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV %D, continuing calibration %D, LCS/LCSD %R, and RPD between columns, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

Port of Bellingham
Polychlorinated Biphenyls - Data Qualification Summary - SDG 22F0420

Sample	Analyte	Flag	A or P	Reason
HS-13SS-0-12-220621 HS-14SS-0-12-220621	Aroclor-1260	J (all detects)	A	Initial calibration verification (%D)
HS-13SS-0-12-220621 HS-14SS-0-12-220621	Aroclor-1260 Aroclor-1262 Aroclor-1268	J (all detects) J (all detects) J (all detects)	A	Continuing calibration (%D)
HS-13SS-0-12-220621 HS-14SS-0-12-220621	Aroclor-1254 Aroclor-1260	J (all detects) J (all detects)	A	Laboratory control samples (%R)
HS-13SS-0-12-220621	Aroclor-1260	J (all detects)	A	Target analyte quantitation (RPD between two columns)

Port of Bellingham
Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG 22F0420

No Sample Data Qualified in this SDG

LDC #: 54841A3b

SDG #: 22F0420

Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 8/31/22

Page: 1 of 1

Reviewer: BF

2nd Reviewer: [illegible]

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	SW / A	
II.	Initial calibration/ICV	A / SW	%RSD / ICV ≤ 20
III.	Continuing calibration	SW	CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	SW	LCS ID
IX.	Field duplicates	N	
X.	Target analyte quantitation	SW	
XI.	Target analyte identification	N	
XII.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
2	HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Notes:

	BKF0674						

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II. Aroclor 1262
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ. Aroclor 1268
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. 2,4'-DDD	KK. Oxychlordane
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL. trans-Nonachlor
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM. cis-Nonachlor
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:_____

LDC #: 54841A3

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: FT

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

METHOD : GC HPLC

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
all	cooler	temp=	10.9°C				no qual

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:
- Water unpreserved: Aromatic within 7 days, non-aromatic within 14 days of sample collection.
- Water preserved: Both within 14 days of sample collection.
- Soils: Both within 14 days of sample collection.
- Encores unpreserved: Both within 48 hours of sample collection.
- Encores preserved: Both within 14 days of sample collection.

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

LDC #: 54841A3b

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported CRQLs

Reviewer: FT

METHOD: ✓ GC ___ HPLC

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

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Associated Samples	Compound Name	Findings (% RPD Between Col ≤ 40)	Qualifications
	1	BB	90.8	Jdet/A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 54841A3D

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: FT

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of initial calibration verification calculation was performed? __%D or __%R
Y N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?
Y N N/A Did the initial calibration verification standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
	4/5/22	ICV	ZB5	25.1		All	Jdet/A qual BB (det)
	0241		ZB35	30.9		↓	↓
			note: Z, AA, Aroclor 1262 + 1268 has its own ICV				

LDC #: 54841 A3b

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: ✓ GC ___ HPLC

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

What type of continuing calibration calculation was performed? ___%D or ___%R

Y N N/A Were continuing calibration standards analyzed at the required frequencies?

Y N N/A Did the continuing calibration standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?

Level IV Only

Y N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Detector/ Column	Compound	%D (Limit ≤ 20.0)	RT (limit)	Associated Samples	Qualifications
	7/5/22 1942	ccv 3	ZB 35	Y	32.7		All	J dit/A qual Y (ND)
	7/6/22 0105	ccv 6	ZB35	BB	57.5		All	J dit/A qual BB Aroclor 1262 + Aroclor 1268 (BB dit for all)
				Note: Analytical Batch has 1248, 1254				ccv

LDC #: 54841A3b

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FT

METHOD: ✓ GC __ HPLC

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

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?

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

Level IV/D Only

Y N [✓ N/A] Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	BKF0674-	BB	157 (50-150)	154 (50-150)	( )	All	Jdet/P
	LCS1D		( )	( )	( )		qual Z, AA, BB,
			( )	( )	( )		Aroclor 1262 + 1268
			( )	( )	( )		(AA + BB are
			( )	( )	( )		det for all)
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: September 2, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22F0420

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Arsenic, Cadmium, Copper, and Zinc by Environmental Protection Agency (EPA) SW 846 Method 6010D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Instrument Calibration

Initial and continuing calibrations were performed as required by the method.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

III. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Arsenic	0.476 mg/Kg	HS-13SS-0-12-220621 HS-14SS-0-12-220621

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
HS-13SS-0-12-220621	Arsenic	1.84 mg/Kg	9.98U mg/Kg
HS-14SS-0-12-220621	Arsenic	2.84 mg/Kg	13.0U mg/Kg

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

VIII. Serial Dilution

Serial dilution was not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

Port of Bellingham
Metals - Data Qualification Summary - SDG 22F0420

No Sample Data Qualified in this SDG

Port of Bellingham
Metals - Laboratory Blank Data Qualification Summary - SDG 22F0420

Sample	Analyte	Modified Final Concentration	A or P
HS-13SS-0-12-220621	Arsenic	9.98U mg/Kg	A
HS-14SS-0-12-220621	Arsenic	13.0U mg/Kg	A

LDC #: 54841A4b
SDG #: 22F0420
Laboratory: Analytical Resources, Inc., Tukwila, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 9/1/22
Page: 1 of 1
Reviewer: LN
2nd Reviewer: A

METHOD: Metals (EPA SW-846 Method 6010D)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Instrument Calibration	A	
III.	ICP Interference Check Sample (ICS) Analysis	A	
IV.	Laboratory Blanks	SW	
V.	Field Blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	
VII.	Duplicate sample analysis	N	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS
X.	Field Duplicates	N	
XI.	Target Analyte Quantitation	N	
XII.	Overall Assessment of Data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
2	HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1,2	As, Cu, Cd, Zn

Analysis Method	
ICP	
ICP-MS	
CVAA	

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

Reviewer: LN

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/kg Associated Samples: 1,2

				Sample Identification								
Analyte	**PB (mg/kg)**	**Maximum ICB/CCB (units)**	**Action Level**	1	2							
As	0.476		5.00	1.84/9.98 U	2.84/13.0U							

Comments: U at RL

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Bellingham

LDC Report Date: September 2, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc., Tukwila, WA

Sample Delivery Group (SDG): 22F0420

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the PRDI Work Plan Attachment C Quality Assurance Project Plan (October 2021) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (November 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A
Total Solids by Standard Method 2540G

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Port of Bellingham
Wet Chemistry - Data Qualification Summary - SDG 22F0420

No Sample Data Qualified in this SDG

Port of Bellingham
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22F0420

No Sample Data Qualified in this SDG

LDC #: 54841A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/1/22
SDG #: 22F0420 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc., Tukwila, WA Reviewer: LN
2nd Reviewer: 9

METHOD: (Analyte) TOC (EPA SW-846 Method 9060A), Total Solids (SM2540G)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	
VII.	Duplicate sample analysis	N	
VIII.	Laboratory control samples	A	LCS (No LCS for Total Solids)
IX.	Field duplicates	N	
X.	Target Analyte Quantitation	N	
XI	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HS-13SS-0-12-220621	22F0420-01	Sediment	06/21/22
2	HS-14SS-0-12-220621	22F0420-02	Sediment	06/21/22
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

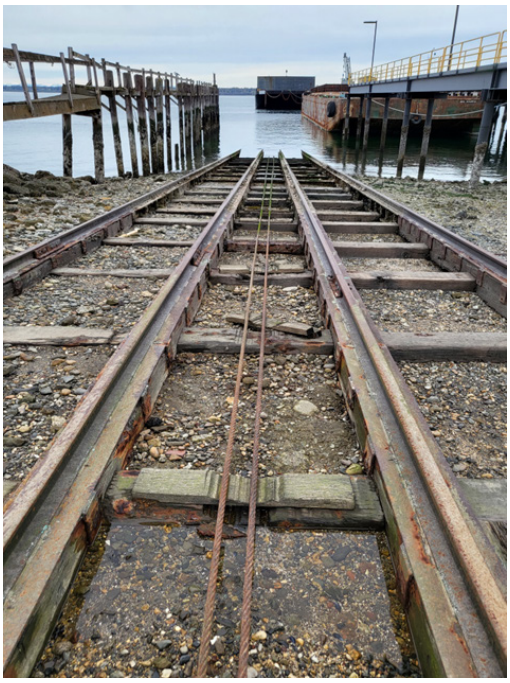
Notes:

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1,2	Total Organic Carbon, Total Solids

Shoreline Survey Photographs

SMU4A/SMU4B Area, North-Facing, 04/20/22



SMU4A/SMU4B Area, West-Facing, 04/20/22

SMU4A/SMU4B Area, Northeast-Facing, 04/20/22

East Marine Walkway, Southwest-Facing, 04/20/22

East Marine Walkway, South-Facing, 04/20/22

Shoreline Bulkhead Area, East-Facing, 04/20/22

Shoreline Bulkhead Area, South-Facing, 04/20/22

Shoreline Bulkhead Area, Southeast-Facing, 04/20/22

Under West Dock, East-Facing, 04/20/22

West of West Dock, North-Facing, 04/20/22

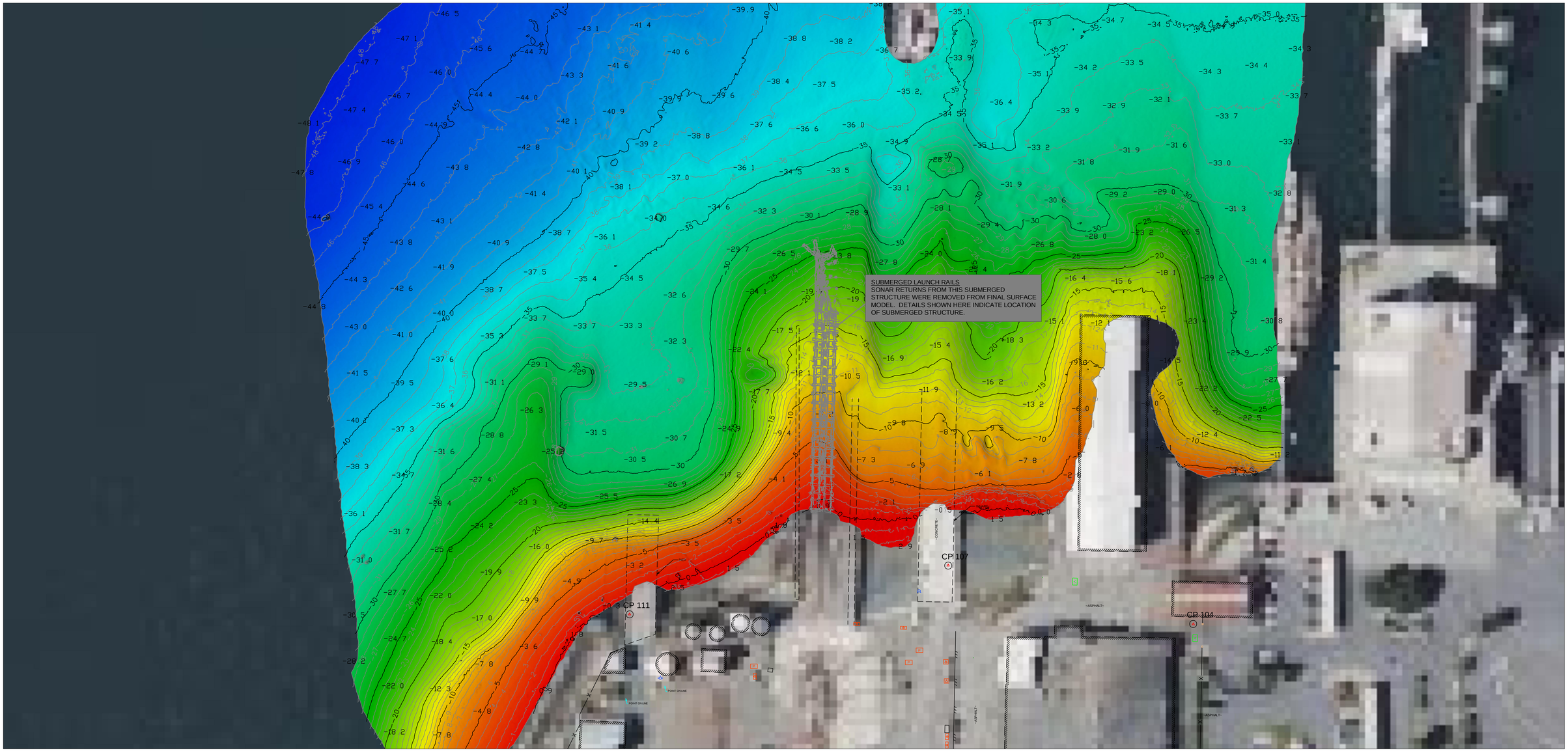
SMU 3b Area, South-Facing, 04/20/22

SMU 3b Area, South-Facing, 04/20/22

SMU 3b Area, Southwest-Facing, 04/20/22

HS-02HA Area, West-Facing, 04/20/22

PORT OF BELLINGHAM
Harris Avenue Shipyard Bathymetry
Fairhaven, Washington
Data Collected August 29, 2022



NOTES:
1. HORIZONTAL DATUM: WASHINGTON STATE PLANE COORDINATES NAD83 (1998). COORDINATES BASED UPON PROJECT CONTROL MONUMENTS SUPPLIED BY PORT OF BELLINGHAM / WILSON ENGINEERING. (SEE CONTROL TABLE)

2. UNITS: U.S SURVEY FEET

3. VERTICAL DATUM: NAVD88. ELEVATIONS ARE IN FEET AND ARE BASED ON PROJECT MONUMENTS PROVIDED BY WILSON ENGINEERING. THE PROJECT NAVD88 VERTICAL CONTROL IS BASED ON CITY OF BELLINGHAM ELEVATION DATUM DATABASE. (SEE CONTROL TABLE)

4. CONTOUR INTERVAL: 1 FOOT.

5. ALL HORIZONTAL POSITIONING AND VESSEL ATTITUDE WAS PROVIDED IN REAL TIME USING AN APPLANIX POS-MV RTK GPS AIDED INERTIAL SENSOR.

6. SOUNDINGS WERE COLLECTED USING A R2SONIC 2022 MULTIBEAM SONAR OPERATING AT 400 KHz. DATA PROCESSING WAS COMPLETED USING HYPACK HYWEEP SOFTWARE.

7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE GENERAL CONDITION OF THE SEABED AT THE TIME OF THE SURVEY. THE CONDITION OF THE BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

8. ALL BATHYMETRIC DATA WAS COLLECTED IN ACCORDANCE WITH THE U.S ARMY CORPS OF ENGINEERS HYDROGRAPHIC SURVEY MANUAL EM-112-02-1003 (NOVEMBER 2013)

PROJECT SURVEY CONTROL (WILSON ENGINEERING)

POINT NO	NORTHING	EASTING	ELEV. (NAVD88)
CP 104	632270.451	1234854.697	14.67
CP 107	632321.511	1234642.035	14.43
CP 111	632279.044	1234365.615	15.05

NORTHWEST HYDRO INC.
31 COUGAR CREEK RD.
SKAMANIA, WA 98648
PH (360) 241-7313
EMAIL: james@northwesthydro.com

ATTACHMENT A-5
EELGRASS AND MACROALGAE SURVEY REPORT

Introduction

The eelgrass and macroalgae surveys were performed on June 21, 2022, by Anchor QEA, LLC; Gravity Marine Consulting, Inc.; and Global Diving Salvage, Inc. Eelgrass and macroalgae surveys were conducted using sonar, towed video, diver, and shoreline survey methods in planned shallow-water areas. The majority of the survey areas were accessible by survey boat and were performed using towed video and sonar. Diver surveys were performed in tandem with the debris survey in January 2022 where overwater cover was present (e.g., the main pier and the barge loading dock) and in areas where there was limited vessel access (e.g., the rail span structure interior, near mooring lines). Visibility was limited during the survey, so photograph or video documentation could not be recorded during the dive survey. The shoreline surveys were performed at low tide in late April 2022. A photograph summary of shoreline conditions is included in Attachment A-3 of the *Pre-Remedial Design Investigation In-Water Data Report* (In-Water Data Report).

The following sections summarize the eelgrass and macroalgae survey results. Sonar survey results are presented in Figure 1 of this survey report, and a summary figure of the sonar survey results with the debris survey results is included as Figure A-3 of the In-Water Data Report. A description of eelgrass, other aquatic vegetation, substrate, and wildlife documented during the surveys per survey area is presented in Table 1.

Results

Overall, native eelgrass (*Zostera marina*) beds were observed in two locations within the survey areas. Non-native eelgrass (*Nanozostera japonica*) was occasionally observed floating on the water surface during the surveys, but rooted non-native eelgrass was not observed within the survey areas.

Aquatic vegetation species observed during the surveys included sugar kelp (*Laminaria saccharina*), rockweed (*Fucus distichus*), sea lettuce (*Ulva lactuca*), epiphytic red algae (*Smithora naiadum*), and red algae (*Porphyra* spp. and *Rhodophyta* spp.) seaweed. These species were observed both attached to the substrate and unattached and floating in the water column or on the water surface during the surveys.

The vegetation sonar results are shown in Figure 1 of this survey report and Figure A-4 of the In-Water Data Report. As shown on these figures, the color coding of the sonar data identifies the presence and absence of eelgrass and the height of the eelgrass and other aquatic vegetation. Dark green and light green colors identify areas with no aquatic vegetation or vegetation species other than eelgrass, such as sea lettuce, iridescent seaweed, and red algae seaweed. Yellow, orange, and

red colors correspond to eelgrass presence with increasing height. Areas with taller eelgrass beds also typically correspond to higher eelgrass plant density. Analysis of the corresponding video survey data confirmed the eelgrass presence and absence identified by the sonar data.

Substrate in the survey areas consisted of a mixture of silt, sand, shell hash, gravel, cobbles, angular rock, and riprap. Gravel, silt, sand, and shell hash were the dominant substrate in the survey areas. Cobbles, angular rock, and riprap were common near the armored shorelines and interim action area.

Wildlife observed during the video survey included a sea star species, and Dungeness crab (*Metacarcinus magister*). Clam shells and clam holes in the substrate were present throughout the survey areas. A summary of the eelgrass results per survey area are presented in the following subsections and in Table 1.

Survey Area RDU-IA-2

The survey of Area RDU-IA-2 was performed using sonar and towed video. No eelgrass was observed in the survey area. The majority of the survey area is bare substrate with a few small patches of other aquatic vegetation present (Table 1).

Survey Area RDU-IA-4

The survey of Area RDU-IA-2 was performed using sonar and towed video. Moderately dense eelgrass beds were observed in the survey area (Figure 1; Figure A-4). Areas outside the eelgrass beds included a mix of bare substrate and other aquatic vegetation species (Table 1). Crabs were identified in the transition zone between the rocky shoreline and sandy silt bottom. Flatfish were identified in the portion of the survey area with sandy silt, shell fragments, and eelgrass.

Survey Area RDU 4A

The survey of Area RDU-4A was performed using sonar and towed video. No eelgrass was observed in the survey area. The majority of the survey area is bare substrate with a few small patches of other aquatic vegetation present (Table 1).

Survey Area RDU E

The survey of Area RDU-E was performed using sonar and towed video. No eelgrass was observed in the survey area. The majority of the survey area is bare substrate with a few small patches of other aquatic vegetation present (Table 1).

Survey Area RDU G

The survey of Area RDU-G was performed using sonar and towed video. No eelgrass was observed in the survey area. The majority of the survey area is bare substrate with a few small patches of other aquatic vegetation present (Table 1). The southern portion of the survey area, along the shoreline, was noted to be full of riprap, boulders, and wood debris during the diver survey.

Survey Area RDU 3B

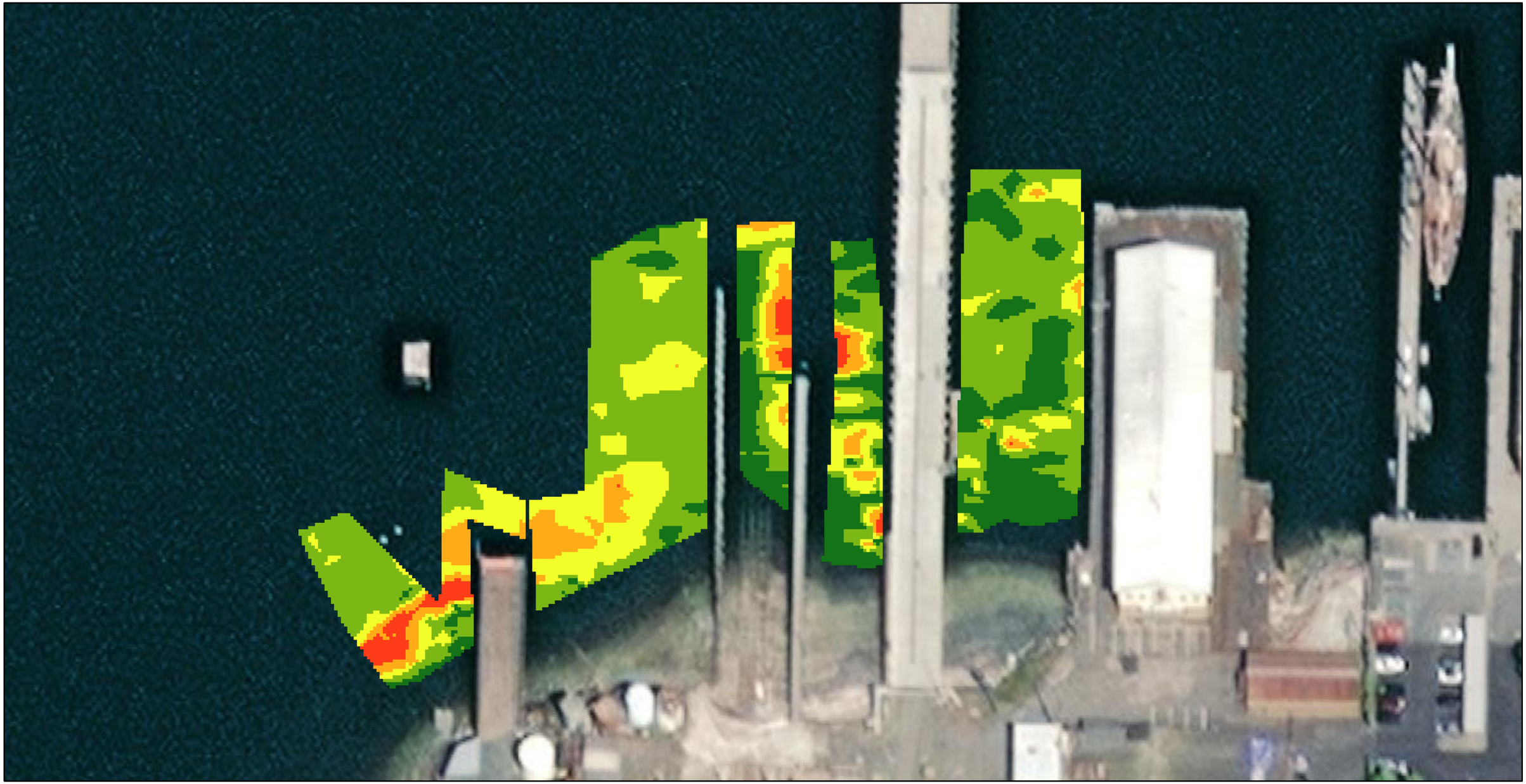
The survey of Area RDU-3B was performed using sonar and towed video. Moderately dense eelgrass beds were observed in the survey area (Figure 1; Figure A-4). Areas outside the eelgrass beds included a mix of bare substrate and other aquatic vegetation species (Table 1). Crabs were identified in the eelgrass beds.

Table

Table 1
Eelgrass and Macroalgae Survey Results Summary

Survey Area	Eelgrass	Other Aquatic Vegetation	Substrate	Wildlife
RDU-IA-2	No eelgrass observed. Survey area is dominated by bare substrate with some small patches of other aquatic vegetation.	Sea lettuce, iridescent seaweed, epiphytic red algae, and red algae seaweed	Silt, sand, and shell hash	None
RDU-IA-4	Eelgrass was observed in a discrete portion of the survey area. The rest of the survey consists of a varied surface with patches of other aquatic vegetation as well as patches of bare substrate.	Sea lettuce, iridescent seaweed, epiphytic red algae, and red algae seaweed	Silt, sand, and shell hash	Crabs and flatfish present
RDU 4A	No eelgrass was observed. Other aquatic vegetation is present. Variation of vegetation and bare substrate are present within the survey area.	Sea lettuce, iridescent seaweed, epiphytic red algae, and red algae seaweed	Silt, sand, and shell hash	None
RDU E	No eelgrass was observed. Survey area is dominated by bare substrate with some small patches of other aquatic vegetation.	Sea lettuce, iridescent seaweed, epiphytic red algae, and red algae seaweed	Silt, sand, and shell hash	None
RDU G	No eelgrass was observed. Survey area is dominated by bare substrate with some small patches of other aquatic vegetation.	Sea lettuce, iridescent seaweed, epiphytic red algae, and red algae seaweed	Silt, sand, and shell hash; angular rock, cobble, and riprap along shoreline	None
RDU 3B	Eelgrass was observed in a discrete portion of the survey area. The rest of the survey consists of a varied surface with patches of other aquatic vegetation as well as patches of bare substrate.	Sea lettuce, iridescent seaweed, epiphytic red algae, and red algae seaweed	Silt, sand, and shell hash	Crab in eelgrass

Figure



Survey Area

Geodetic Settings	
Horizontal Datum	NAD 83
Vertical Datum	N/A
Coordinate System	SP WA North FIPS 4601
Horizontal Units	US Survey Feet
Vertical Units	US Survey Feet
Vertical Control	WSRN
Horizontal Control	WSRN

Survey Equipment	
Single-beam Sonar	BioSonics MX
Nav System	Trimble SPS461
RTK Corrections	WSRN
Speed of Sound	YSI CastAway CTD
Survey Date	21 JUNE 2022
Data Collection & Processing Software	Hypack 2022/Visual Aquatic
Mapping and Product software	ArcGIS Pro 2.9

0 20 40 80 120 160 Feet

N

Veg Height (m)

- 0.01 - 0.08
- 0.09 - 0.19
- 0.2 - 0.31
- 0.32 - 0.52
- 0.53 - 1.03

Anchor QEA - Harris Shipyard
Vegetation Height (m)
Bellingham, WA
June 21st, 2022

Data Acquisition:	R.McEliece/E. Sloan
Data Processing:	R. McEliece
Drafted by:	R. McEliece
Reviewed by:	S.Hinz

GRAVITY

Sediment Core Processing Log

ANCHOR QEA

Job: PUGET SOUNDS
Job No. 210007-02.01
No. of Sections: 1
Drive Length: 6.0 FT
Recovery: 5.8'
% Recovery: 96.7%
Notes: PROCESSED 5.8'

Station ID: HS-01-SC
Date/Time: 1-20-2022 / PROCESSED 1445
Core Logged By: S. STREHL
Attempt #: 1
Type of Core ☐ Mudmole ☒ Vibracore ☐ Diver Core
Diameter of Core (inches) 4"

Recovered Length (ft)	Size % Gravel	Size % Sand	Size % Fines	Classification and Remarks (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Recovered Length (ft)	ND / NA	Sample	Summary Sketch
		30	70	(0-2.1): SANDY SILT (ML) VERY SOFT, WET, DARK GREY, FINE-GRAINED SAND, TRACE ORGANICS, SLIGHT HYDROGEN SULFIDE-LIKE ODOR. @1.3: 1" WOOD CHUNK	1		0-1	
							1-2	
		70	30	(2.1-6) SILTY SAND (SM): LOOSE, SATURATED, DARK GREY, FINE TO MEDIUM, PREDOMINANTLY FINE, GRADES COARSER W/ DEPTH. @3-6': SHELL HASH + FRAGMENTS INCREASING W/ DEPTH @5.2: DENSITY CHANGE TO MEDIUM DENSE	2		2-3	
					3		3-4	
					4		4-5	
					5		5-6	
				END OF CORE @ 6' (5.8)	6			

* COMPACTION CORRECTION: 5.8/6 = 0.97 FACTOR

Sediment Core Processing Log

ANCHOR QEA

Job: HARRIS SHIPYARD
Job No. 210017-02.01
No. of Sections: 1
Drive Length: 6.0 FT
Recovery: 3.9 FT
% Recovery: 65%
Notes: PROCESSED: 3.9 FT

Station ID: HS-025C
Date/Time: 1-20-2022 / PROCESSED @ 1515:30
Core Logged By: S. STREHL
Attempt #: 2
Type of Core ☐ Mudmole ☒ Vibracore ☐ Diver Core
Diameter of Core (inches) 4
COMPACTION CORRECTION: 3.9/6 = 0.65 INTERVALS

Recovered Length (ft)	Size % Gravel	Size % Sand	Size % Fines	Classification and Remarks (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Recovered Length (ft)	PID / NA	Sample	Summary Sketch
	–	30	70	(0-3.8) SANDY SILT (ML) VERY SOFT, WET, DARK GREY, FINE GRAINED SAND, GRADES COARSER W/ DEPTH, SHEEN HASH, TRACE ORGANICS, SLIGHT HYDROGEN SULFIDE-LIKE ODOR. @0.9: 3" WOOD CHUNK W/ SHEEN @1.8: INCREASE TO SIGNIFICANT SHELL HASH	1		0-1	
							1-2	
					2			
							2-3	
	10	70	20	(3.8-6) SILTY SAND (SM) LOOSE TO MED. DENSE, SATURATED, DARK GREY, FINE TO MED GRAINED SAND, GRADES COARSER W/ DEPTH, SOME FINE SUB-ROUNDED GRAVELS, SHELL HASH @5: ≈2" SANDY SILT LENS: VERY SOFT, WET, GREY (POSSIBLE GW LENS/CONTACT) @5.2-6: INCREASED GRAVEL CONTENT, FINE TO MED SUB-ROUNDED GRAVELS,	3		3-4	
							4-5	
					4			LIQUID LENS
					5		5-6	
				END OF CORE @ 6' (3.9')	6			

Page 1 of 1

* COMPACTION CORRECTION: INTERVALS (EACH FOOT) = 0.65'

Sediment Core Processing Log

ANCHOR QEA

Job: HARBOR SHIPYARDS
Job No. 210007-02.01
No. of Sections: 1
Drive Length: 6 FT
Recovery: 2.4 FT ON BOAT
% Recovery: 48.3% ON BOAT
Notes: PROCESSED 2.2' / REC: 36.6%

Station ID: H/S-035C
Date/Time: 1-21-22 / BEGAN PROCESSING @ 1000
Core Logged By: S. STREHL
Attempt #: 02
Type of Core ☐ Mudmole ☒ Vibracore ☐ Diver Core
Diameter of Core (inches) 4"
* NO COMPACTION CORRECTION

Recovered Length (ft)	Size % Gravel	Size % Sand	Size % Fines	Classification and Remarks (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Recovered Length (ft)	PID / NA	Sample	Summary Sketch
1	5	10	85	(0-1.6) SANDY SILT (ML) VERY SOFT, WET, DARK GREY, FINE-GRAINED SAND, GRADES COARSER, TRACE FINE SUB-ANGULAR GRAVELS, SHELL HASH. @ 0.6-1.6 NO STRUCTURE, FLOWING SILT	1		0-2.2	FLOWING
2	15	70	15	(1.6-2.2) SAND W/ SILT + GRAVEL (SP) LOOSE, WET, DARK GREY, FINE TO COARSE SAND, FINE SUB-ROUNDED GRAVELS, GRADES COARSER, SHELL HASH, REFUSAL LIKELY DUE TO INCREASING GRAVEL CONTENT.	2			
3				END OF CORE @ 2.2	3			

* WHEN CORE OPENED, HEAVILY SATURATED SAMPLE FLOWED OUT OF SAMS AND SIDES, VERY LITTLE STRUCTURE OR DENSITY.

Sediment Core Processing Log

ANCHOR QEA

Job: T/ALASKA SHIPYARDS
Job No. 210007-02.01
No. of Sections: 1
Drive Length: 5.25'
Recovery: ON BOAT: 4'
% Recovery: ON BOAT: 76%
Notes: PROCESSED: 3.4 = 64.8%

Station ID: HS-04SC
Date/Time: 1-21-22 / PROCESSED @ 1215
Core Logged By: S. STRETH
Attempt #: 2
Type of Core ☐ Mudmole ☒ Vibracore ☐ Diver Core
Diameter of Core (inches) 4"

Recovered Length (ft)	Size % Gravel	Size % Sand	Size % Fines	Classification and Remarks (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Recovered Length (ft)	PID NA	Sample	Summary Sketch
	5	25	70	(0-2) SANDY SILT (ML): VERY SOFT, WET, DARK GREY, FINE-GRAINED SAND, TRACE FINE SUB-ROUNDED GRAVEL, TRACE SHELL HASH. @ 0.5: ANTHROPOGENIC DEBRIS: METAL FRAGMENT	1		0-1	FLOWING/ NO STRUCTURE TOP 2'
							1-2	
	15	60	25	(2-5.25) SILTY SAND w/ GRAVEL (SM): LOOSE, WET, DARK GREY, FINE TO MEDIUM GRAINED, MOSTLY FINE-GRAINED SAND, FINE TO MEDIUM SUB ROUNDED GRAVEL, GRADES COARSER W/ DEPTH, SHELL HASH, SLIGHT HYDROGEN SULFIDE-LIKE ODOR. @ 2.5: 2" WOOD FRAGMENT @ 3.5, 4.2, 5: PEACOCK SHEEN FLOURETTE @ 5.1: INCREASE IN GRAVEL CONTENT, UP TO 2" GRAVELS	2		2-3	
					3		3-4	
					4		4-5.25	
				END OF CORE @ 5.25	5			
					6			

* COMPACTION CORRECTION: 3.4 RECOVERY / 5.25 DRIVE = 0.65 INTERVALS IN 0-4 THEN 4-5.25 FINAL INTERVAL

Sediment Core Processing Log

ANCHOR QEA

Job: HARRIS SITE PYMNOS
Job No. 210007-02.01
No. of Sections: 1
Drive Length: 6 FEET
Recovery: 4.7'
% Recovery: 78.3%
Notes: PROCESSED: 4.7' → COMPACTION CORRECTION: 0.78 FACTOR APPLIED

Station ID: HS-05SC
Date/Time: 1-21-22 / PROCESSED 1330
Core Logged By: S. STREITZ
Attempt #: 1
Type of Core ☐ Mudmole ☒ Vibracore ☐ Diver Core
Diameter of Core (inches) 4"

Recovered Length (ft)	Size % Gravel	Size % Sand	Size % Fines	Classification and Remarks (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)
1		10	90	(0-1.4) SILT (ML) SOFT, WET, DARK GREY TO 0.3, THEN FIRM SATURATED, GREY, SILT (ML), SOME FINE GRAINED SAND, @ 0-0.3: SHELL HASH @ 0.3-1.4: FIRM CLAYEY SILT WITH LOW PLASTICITY
2	5	75	20	(1.4-6) SILTY SAND (SM) LOOSE, SATURATED, DARK GREY, FINE TO MEDIUM GRAINED SAND, GRADES COARSER W/ DEPTH, TRACE FINE SUB-ROUNDED ROUNDED GRAVELS, SIGNIFICANT SHELL HASH + FRAGMENTS; INTACT SHELLS UP TO 4", SLIGHT HYDROGEN-SULFIDE ODOR. @ 2.5: 1" WOOD FRAGMENT @ 5.8: 1.5" SUB-ROUNDED GRAVEL
3				
4				
5				
6				END OF CORE @ 6'

Recovered Length (ft)	PID	Sample	Summary Sketch
1	NA	0-1	
2		1-2	
3		2-3	
4		3-4	
5		4.5	
6		5-6	

Sediment Core Processing Log

ANCHOR QEA

Job: HARBOR SHIPYARD 5
Job No. 210007-02.01
No. of Sections: 1
Drive Length: 6.0'
Recovery: 5.9'
% Recovery: 98%
Notes: PROCESSED: 5.9'

Station ID: HS-06SC
Date/Time: 1-21-22 / PROCESSED: 1530
Core Logged By: S. SMITH
Attempt #: 2
Type of Core ☐ Mudmole ☒ Vibracore ☐ Diver Core
Diameter of Core (inches) 4"
COMPACTION CORRECTION: 0.98 INTERVALS

Recovered Length (ft)	Size % Gravel	Size % Sand	Size % Fines	Classification and Remarks (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Recovered Length (ft)	PID NA	Sample	Summary Sketch
	1	30	70	(0-5.5) SANDY SILT (ML)			0-1	
				VERY SOFT, WET TO 1.5, THEN SOFT, SATURATED, DARK GREY, FINE-GRAINED SAND, ORGANICS: FIBERS, TRACE SHELL HASH, SLIGHT HYDROGEN SULFIDE - LIKELY LOCAL.			1-2	
				@ 2.6: DUCT TAPE			2-3	
	10	65	25	(5.5-6): SILTY SAND (SM)			3-4	
				DENSE, MOIST, BLUEISH GREY, FINE TO MEDIUM GRAINED SAND, SOME FINE TO MEDIUM SUB-ROUNDED TO SUB-ANGULAR GRAVEL.			4-5	
							5-6	POSSIBLE NATIVE
				END OF CORE @ 6'				

ANCHOR QEA

Sediment Core Collection Log

Job: Harris Ave. PRDI
Job No:
Field Staff: NS
Contractor: Caranty
Vertical Datum: ~

Station ID: HS-07SC
Attempt No. 1
Date: 01-21-22
Logged By: NS
Horizontal Datum: NAD83 WA State Plane North, feet

Field Collection Coordinates:
Lat/Northing: 632620.42
Long/Easting: 1234548.31

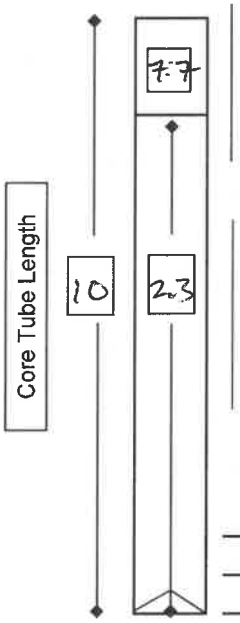
A. Water Depth
DTM Depth Sounder: –
DTM Lead Line: 33.4 ft

B. Water Level Measurements
Time: 16:38
Height: –
Source: –

C. Mudline Elevation
to calculate

Core Collection Recovery Details:
Core Accepted: Yes / (No)
Core Tube Length: 10 ft
Drive Penetration: 6 ft
Headspace Measurement: 7.7 ft
Recovery Measurement: 2.3 ft
Recovery Percentage: 38.3%
Total Length of Core To Process: N/A

Recovery Measurements (prior to cuts)



Drive Notes:

0-6 ft: slow, difficult driving
@ 10 ft: end of drive

Sections To Process:
A: N/A
B:
C:
D:

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

NS
0-1 ft: Black ~~silt~~ silt
NS
1-~~2.4~~ ft: Dense grey fine ~~salt~~ NS sand w/ gravel
1-2.3 ft:

Notes: NS

ANCHOR QEA

Sediment Core Collection Log

Job: Harris Ave PRDI
Job No:
Field Staff: NS
Contractor: Gravity
Vertical Datum: -

Station ID: HS-07SC
Attempt No. 2
Date: 01-21-22
Logged By: NS
Horizontal Datum: NAD83 WA State Plane North, feet

Field Collection Coordinates:
Lat/Northing: 632619.04
Long/Easting: 1234552.01

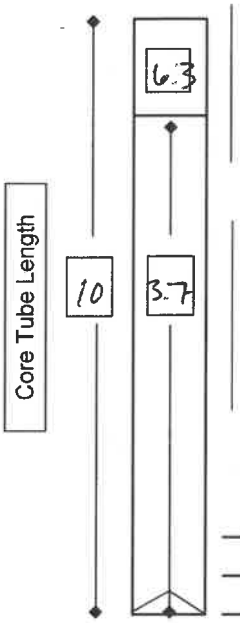
A. Water Depth
DTM Depth Sounder: -
DTM Lead Line: 34.0

B. Water Level Measurements
Time: 16:56
Height: -
Source: -

C. Mudline Elevation

Core Collection Recovery Details:
Core Accepted: Yes / (No)
Core Tube Length: 10 ft
Drive Penetration: 6 ft
Headspace Measurement: 0.3 ft
Recovery Measurement: 3.7 ft
Recovery Percentage: 61.6 %
Total Length of Core To Process: N/A

Recovery Measurements (prior to cuts)



Sections To Process:
A: N/A
B:
C:
D:

Drive Notes:

0-6 ft: Very hard driving
@ 6ft: End of drive

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

0-2 ft: Grey silt with trace shell hash

2-3.7 ft: ~~Clay~~ light grey dense sand w/ gravel

Notes:
Core tube bent.

ANCHOR QEA

Sediment Core Collection Log

Job: Harris Ave PRDI
Job No:
Field Staff: NS
Contractor: Gravity
Vertical Datum: –

Station ID: HS-07SC
Attempt No. 3
Date: 1-21-22
Logged By: NS
Horizontal Datum: NAD83 WA State Plane North, feet

Field Collection Coordinates:
Lat/Northing: 632621.96
Long/Easting: 1234552.94

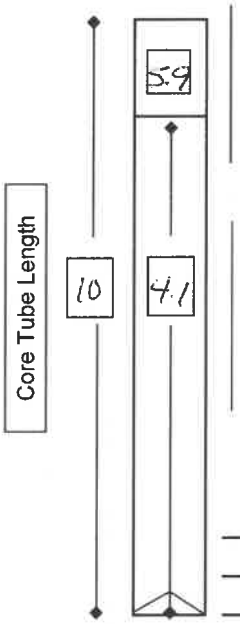
A. Water Depth
DTM Depth Sounder: –
DTM Lead Line: 33.8 ft

B. Water Level Measurements
Time: 17:25
Height: –
Source: –

C. Mudline Elevation
to calculate

Core Collection Recovery Details:
Core Accepted: (Yes) No
Core Tube Length: 10 ft
Drive Penetration: 6 ft
Headspace Measurement: 5.9 ft
Recovery Measurement: 4.0 ft
Recovery Percentage: ~~[illegible]~~ 66%
Total Length of Core To Process: 4.0 ft

Recovery Measurements (prior to cuts)



Drive Notes:

0 - 6 ft: slow, difficult driving
@ 6 ft: end of drive

Sections To Process:
A: 0 - 10 ft
B:
C:
D:

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

0 - 2 ft: Dark grey silt
2 - 4.1 ft: Grey silty sand w/ shell fragments.
@ Bottom of core tube: very hard, dense sand with gravel and shells

Notes:

NS

Sediment Core Processing Log

ANCHOR QEA

Job: HARRIS SITE/MODS
Job No. 210007-02.01
No. of Sections: 1
Drive Length: 6 FT
Recovery: ON BOAT 4.8 FT
% Recovery: ON BOAT 80%
Notes: PROCESSED: 4.8 / COMPACTION CORRECTIONS

Station ID: HS-085C
Date/Time: 1-20-22 / PROCESSED @ 1100
Core Logged By: S. STREHL
Attempt #: 1
Type of Core ☐ Mudmole ☒ Vibracore ☐ Diver Core
Diameter of Core (inches) 4"

Recovered Length (ft)	Size % Gravel	Size % Sand	Size % Fines	Classification and Remarks (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Recovered Length (ft)	PID	Sample	Summary Sketch
		30	70	(0-1.1) SANDY SILT (ML): VERY SOFT, WET, BROWNISH GREY, TRACE ORGANICS, SHELL HASH.	1		0-1	
		70	30	(1.1-6): SILTY SAND (SM): LOOSE, SATURATED, BROWNISH GREY, FINE TO MEDIUM SAND, MOSTLY FINE, GRADES COARSER W/ DEPTH. SHELL HASH + SHELL FRAGMENTS	2		1-2	
				@ 1.1-2.2: SIGNIFICANT SHELL FRAGMENTS UP TO 2" AND SHELL HASH	3		2-3	
				@ 2.2: DENSITY CHANGE TO MED. DENSE.	4		3-4	
					5		4-5	
					6		5-6	
				END OF CORE @ 6* (4.8)				

Δ - SHELLS
OM = ORGANICS

* COMPACTION CORRECTION: INTERVALS 0.8'

ANCHOR QEA

Sediment Core Collection Log

Job: Harris Ave PRDI
Job No:
Field Staff: NS
Contractor: Gravity
Vertical Datum: -

Station ID: HS-09.SC
Attempt No. 1
Date: 01-21-22
Logged By: NS
Horizontal Datum: NAD83 WA State Plane North, feet

Field Collection Coordinates:
Lat/Northing: 632754.40
Long/Easting: 1234608.89

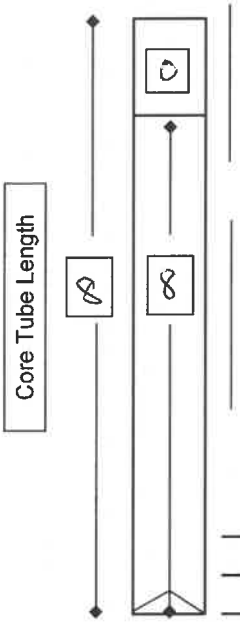
A. Water Depth
DTM Depth Sounder: -
DTM Lead Line: 40.5

B. Water Level Measurements
Time: 15:31
Height:
Source:

C. Mudline Elevation
to calculate

Core Collection Recovery Details:
Core Accepted: Yes / (No)
Core Tube Length: 8 ft
Drive Penetration: 6 ft
Headspace Measurement: 0 ft
Recovery Measurement: 8 ft
Recovery Percentage: 133.3%
Total Length of Core To Process: N/A

Recovery Measurements (prior to cuts)



Drive Notes:

0-6 ft: very easy driving
@ 6 ft: end of drive

Sections To Process:
A: N/A
B:
C:
D:

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

~~0-8 ft:~~ NS

0-3.5 ft: Black silt w/ shell hash (moderate)
3.5-8 ft: Grey silt

Notes:

NS

ANCHOR QEA

Sediment Core Collection Log

Job: Harris Ave PRDI
Job No:
Field Staff: NS
Contractor: Gravity
Vertical Datum: -

Station ID: HS-09SC
Attempt No. 2
Date: 01-21-22
Logged By: NS
Horizontal Datum: NAD83 WA State Plane North, feet

Field Collection Coordinates:
Lat/Northing: 632754.95
Long/Easting: 1234606.51

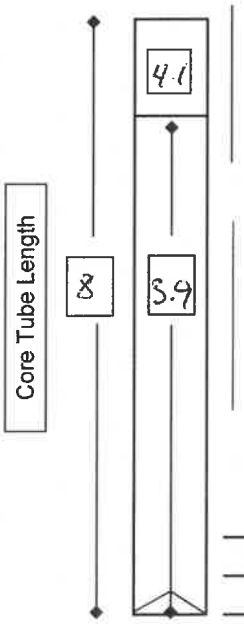
A. Water Depth
DTM Depth Sounder: -
DTM Lead Line: -10.8 ft

B. Water Level Measurements
Time: 15:54
Height: -
Source: -

C. Mudline Elevation
to calculate

Core Collection Recovery Details:
Core Accepted: Yes / No
Core Tube Length: 8 ft
Drive Penetration: 6
Headspace Measurement: 4.1 ft
Recovery Measurement: 3.92 ft
Recovery Percentage: 65.3%
Total Length of Core To Process: N/A

Recovery Measurements (prior to cuts)



Drive Notes:

0-6 ft: easy driving
@ 6 ft: end of drive

Sections To Process:
A: N/A
B:
C:
D:

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

0-3.92 ft: Dark gray silt

NS

Notes:

ANCHOR QEA

Sediment Core Collection Log

Job: Harris Ave PRDI
Job No:
Field Staff: NS
Contractor: Gravity
Vertical Datum: –

Station ID: HS-09SC
Attempt No. 3
Date: 01-21-22
Logged By: NS
Horizontal Datum: NAD83 WA State Plane North, feet

Field Collection Coordinates:
Lat/Northing: 632753.73
Long/Easting: 1234608.53

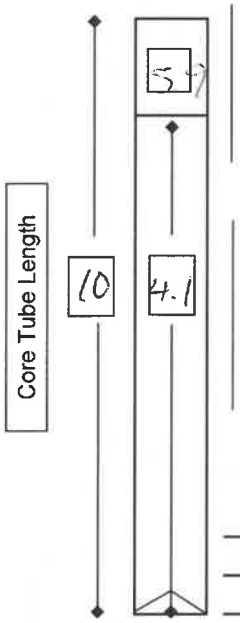
A. Water Depth
DTM Depth Sounder: –
DTM Lead Line:

B. Water Level Measurements
Time: 16:09
Height: –
Source: –

C. Mudline Elevation
to calculate

Core Collection Recovery Details:
Core Accepted: ~~Yes~~ / No
Core Tube Length: 10 ft
Drive Penetration: 10 ft
Headspace Measurement: 5.9 ft
Recovery Measurement: 4.1 ft
Recovery Percentage: 108%
Total Length of Core To Process: 4.1 ft

Recovery Measurements (prior to cuts)



Sections To Process:
A: 0-10 ft
B:
C:
D:

Drive Notes:

0-6 ft: steady driving
@ 10 ft: end of drive

Core Field Observations and Description:

Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

0-2.5 ft: Dark grey silt
2.5-4.1 ft: grey silt with shell fragments

Rock in bottom of core tube

Notes:

NS

Surface Sediment Collection Log

Job: Harris Shipyards
Station: HS-015G
Job No:
Date: 1-18-22
Field Staff: SS/CB
Sample Method: VV G
Contractor: Gravity
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: —
DTM Lead Line: 32.5

Tide Measurements
Time: 1508
Height: 7.74

Mudline Elevation (datum): calculated after sampling

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	15:00	632588.09	1234714.04	N	13	NOT ENOUGH SAMPLE FOR STRATIFIED GRAB
2	15:07	632592.48	1234717.44	Y	19	Overlying water, flat surface

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

0-0.5: WET, LOOSE, BROWN, SILT (5/95) TRACE FG SAND. SUFFICIENT SHELLS / FRAGMENTS, WOOD DEBRIS, BIOTA: SNAILS

0.5- BOTTOM: WET, LOOSE, DARK GREY, SANDY SILT (mu) (30/70), SIGNIFICANT SHELL HASH, ORGANICS, STRONG H2S - LIKE ODOR.

Sample Depth: 0-12cm, 12-

Sample Containers:

Analyses: 0-12 cm :
12-18 cm :

Surface Sediment Collection Log

Job: HARRIS SHIPYARDS
Station: HS-02-SG
Job No:
Date: 1-18-22
Field Staff:
Sample Method: VVG
Contractor:
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: ~
DTM Lead Line: 12.8
Mudline Elevation (datum): calculated after sampling

Tide Measurements
Time: 13:15
Height: 7.09

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
#1	13:15	632398.37	1234715.18	Y	18	OVERLYING WATER, SURFACE INTACT

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

0-0.5: WET, LOOSE, BROWN, SILT (5/95), SIGNIFICANT SHELLS, SHELL FRAGMENTS, SEAWEED, BIOTA: SNAILS

0.5-BOTTOM: WET, MODERATE, DARK GREY, SILTY SAND (70/30) FG TO MEDGRAINED, TRACE GRAVEL, SHELL HASH, GRAVEL COBBLES

Sample Depth: 0-12 cm, 12-17 cm

Sample Containers:

Analyses: PAHs, PCBs, METALS, TOC, TS, BIOASSAY (0-12)

(12-17): PAHs, PCBs, METALS, TS, TOC

Surface Sediment Collection Log

Job: HARRIS SHIPYARDS
Job No:
Field Staff: SS / CB
Contractor: GRAVITY

Station: HS-035G
Date: 1-18-22
Sample Method: VV
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: —
DTM Lead Line: 18.3

Tide Measurements
Time: 14:00
Height: 7.35

Mudline Elevation (datum): calculated after sampling

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
#1	14:00	632454.24	1734671.76	Y	18	OVERLYING WATER, SURFACE INTACT

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions GRAVELLY

0-0.5': WET, LOOSE, BROWN, SILT (M/M) (30/5/65). SURFICIAL GRAVELS
2-6" SUBRND TO SUB ANG. SIGNIFICANT SHELLS, SHELL FRAGMENTS. ANTHRO DEBRIS: WOOD CHUNKS, PLASTIC, METAL, GLASS. BIOTA: CRABS, STARFISH, WORMS. TRACE SHEEN
0.5 TO BOTTOM: WET, LOOSE, DARK GREY, SANDY SILT (30/70) FG SAND, SILTY HASH, FREE-FLOATING WOOD DEBRIS + STICKS, H2S-LIKE ODOR.

Sample Depth:

Sample Containers:

Analyses: 0-12
12-17:

Surface Sediment Collection Log

Job: Harris Shipyards
Job No:
Field Staff: SS + CB
Contractor: Gravity

Station: HS-045G
Date: 1-19-22
Sample Method: VV
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: ——
DTM Lead Line: 35.1 ft

Tide Measurements
Time: 11:34
Height: 6.72ft

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes: 11 ft West of station in Attempt #1. 10.6ft off station for #2.

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	11:34	632616.97	1234615.27	N	12 cm	Low volume, sloped surface
2	11:44	632620.52	1234614.95	Y	17 cm	Overlying water and surface intact

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

0-0.5": Wet, loose, brown sandy (5%) silt (90%) w/ trace gravel (5%)
0.5" - Bottom: Wet, loose, dark grey fine-med sandy silt (70%)
Significant shell hash and shell fragments. (30%)
H_2S-like odor (slight). Snails and hermit crabs.

Sample Depth: 0-12cm and 12-16cm

Sample Containers: 8 oz Jar x 4, 16 oz Jars x 2, 2 gallon Bag

Analyses: 0-12 cm: PCBs, PAHs, Metals, TS, TOC, Archive + Bioassay
12-16 cm: PCBs, PAHs, Metals, TS, TOC, + Archive

Surface Sediment Collection Log

Job: Harris Shipyards
Job No:
Field Staff: SS + CB
Contractor: Gravity

Station: HS-055G
Date: 1.19.22
Sample Method: VVG
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: _____
DTM Lead Line: 23.3ft

Tide Measurements
Time: 10:38
Height: 7.25ft

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes: Approx. 23.2 ft from target location due to inaccessability from being under dock.

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	10:38	632499.41	1234600.38	Y	17cm	Jaws closed, overlying water flat surface

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions SS

0-5" - Wet, loose, brown silt (~~10~~%) with 10% gravel and trace sand (5%)
5"-Bottom - Wet, loose, dark grey fine-med grain sandy (30%) silt (70%)
Sheen observed with HC-like odors (slight) and med. H2S-like odors
Significant shell hash and some shell fragments
Slight sticks

Sample Depth: 0-12cm and 12-16cm

Sample Containers: 8oz Jars x 6, 16oz Jar x 3, 2 gallon Bag

Analyses: 0-12cm: PCBs, PAHs, Metals, TS, TOC, Archive, BioAssay
12-16cm: PCBs, PAHs, Metals, TS, TOC, Archive

Dup: @1045 (HS-1005SG [redacted]-0-12-220119) : PCB's, PAH s, METALS, TS, TOC, ARCHIVE

Surface Sediment Collection Log

Job: Harris Shipyards
Job No:
Field Staff: SS + CB
Contractor: Gravity

Station: HS-06SG
Date: 1-19-22
Sample Method: VVG
Proposed Coordinates: Lat.
Long.

Water Height —
DTM Depth Sounder: _____
DTM Lead Line: 18.3 ft

Tide Measurements
Time: 09:17
Height: 8.39 ft

Mudline Elevation (datum): calculated after sampling

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes: _____

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	09:10	632449.25	1234582.01	N	16 ~~in~~ cm	Low volume, not enough stratified
2	09:17	632448.08	1234585.88	N	15cm	Low volume, not enough stratified
3	09:25	632453.44	1234581.32	N	—	Rock stuck in Jaw, not a tight seal.
4	09:28	632457.54	1234587.52	N	—	More rocks stuck in Jaw. No tight seal.
5	09:32	632442.43	1234586.35	N	11 cm	More rocks stuck in Jaw. No tight seal.
6	09:37	632444.96	1234582.27	N	—	Rocks stuck in Jaw, No tight seal.

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

Sample Depth: 0-12 cm and 12-

Sample Containers: 8oz Jars x4, 16oz Jar x2 and 2 gallon Bags

Analyses: 8oz - Archive, 8oz - metals, TS, TOC, 16oz - PAH and PCBs
2 Gallon Bag - Bio Assay

Surface Sediment Collection Log

Job: Harris Shipyards
Job No:
Field Staff: SS + CB
Contractor: Gravity

Station: HS-065G
Date: 1-19-22
Sample Method: VVG
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: —
DTM Lead Line: 18.3 ft

Tide Measurements
Time: 0917
Height: 8.39 ft

Mudline Elevation (datum): calculated after sampling

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
7	09:41	632458.00	1234580.22	N	—	Rocks stuck in Jaw. Not a tight seal.
8	09:44	632448.87	1234578.19	Y	18cm	FLAT SURFACE, OVERLYING WATER

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

0.5" to — Bottom

0-5" - Wet, loose, brown silt (~~55%~~ 75%) and trace sand (5%), 20% gravel
~~Deeper than 0-5"~~ - Wet, loose, dark grey *med. grain sand (70) silt (30)
Biota present, worms, snails, shell fragments, H2S-like odor (slight)

Sample Depth: 0-12 cm and 12-17 cm

Sample Containers:

Analyses: 0-12: PAHs, PCBs, METALS, TOC, TS, ~~ARCHIVE~~ + BIOASSAY
12-17: PAHs, PCBs, METALS, TOC, TS, ~~ARCHIVE~~

* fine to med grain

Surface Sediment Collection Log

Job: Harris Ave Shipyard
Job No: 21007-01.02
Field Staff: NS, DP
Contractor: N/A
Station: HS-01HA
Date: 4.19.22
Sample Method: Hand tools (auger, shovel)
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: _____
DTM Lead Line: _____
Mudline Elevation (datum): calculated after sampling

Tide Measurements
Time: _____
Height: _____

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes: _____

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	1220	Collected	via GPS file	Y	12" (0-1)	Beach sample
1	1305	↓	↓	Y	12" (1-2)	↓

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

0-5": Wet, stiff, slightly sandy, silty clay w/gravel. Shell hash on surface.
5"-2': Wet, loose, f-c sand w/gravel & cobbles. Increasing fines w/depth.

Sample Depth: 0-1 ft: HS-01HA-0-1-220419
1-2 ft: HS-01HA-1-2-220419
Sample Containers: 1 each 8oz jar
Analyses: TCLP metals

Surface Sediment Collection Log

Job: Harris Ave Shipyard
Job No: 210007-01.02
Field Staff: NS, DP
Contractor: N/A

Station: HS-02HA
Date: 4.19.22
Sample Method: Shovel
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: _____
DTM Lead Line: _____
Mudline Elevation (datum): calculated after sampling

Tide Measurements
Time: _____
Height: _____

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes: _____

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	1400	Collected via GPS		Y	0.39	Beach Sample

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

Damp, loose, grey & white shelly sand.

Sample Depth: 0.39"

Sample Containers: 2x8oz

Analyses: PAHs, PCBs, metals, TS, TOC

Surface Sediment Collection Log

Job: HARRIS SHIPYARDS
Job No:
Field Staff: SS / CB
Contractor: GRAVITY

Station: HS-07SS
Date: 01-18-22
Sample Method: VVG
Proposed Coordinates: Lat. [illegible]
Long. [illegible]

Water Height
DTM Depth Sounder: 35.9
DTM Lead Line: 37.4
Mudline Elevation (datum): calculated after sampling

Tide Measurements
Time: 0915
Height: 8.11'

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
01	0915	632517.65	1234891.35	Y	34.5	JAWS CLOSE, OVERLYING WATER, GOOD SEAL

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

→ TOP 0.5' WET, LOOSE, BROWN, SILT, SHELLS + ORGANIC FIBERS
→ 0.5 - BOTTOM WET, LOOSE, DARK GREY, SILT (TRACE FINE SAND) H2S - STRONG ODOR

Sample Depth: 0-17 CM

Sample Containers: ARCHIVE (8oz) + BIOASSAY

Analyses: ARCHIVE + BIOASSAY

Surface Sediment Collection Log

Job: HARRIS SEDIMENTS
Station: HS-0855
Job No:
Date: 01-18-22
Field Staff: SS/C
Sample Method: VVG
Contractor: GRAVITY
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: 36.9
DTM Lead Line: 34.5

Tide Measurements
Time: 1007
Height: 7.40

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes: SURFACE ANGLED BECAUSE OF SLOPE

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in) cm	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
#1	1007	632601.07	1238855.12	Y	16	JAWS CLOSE, OVERLYING WATER

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

TOP 0.5' WET, LOOSE, BROWN SILT (ML) W/ SHELL HASH, TRACE FINE GRAVEL (SUB ANG)
0.5 TO BOTTOM: WET, LOOSE, DARK BROWN, SILT (ML) FG SAND, SHELL HASH, H2S-LIKE ODOR. TRACE, FG GRAVEL
TOP 0.5 : 5/90/5 GRAV/SILT/SAND
0.5 - BOTTOM : 5/85/10 GRAV/SILT/SAND

SIG DIFFERENT

Sample Depth: 0-12 CM

Sample Containers: 16OZ, 8OZ, 8OZ, BIOASSAY BAG

Analyses: PAHS, PCBS, METALS, TS, TOC, BIOASSAY

Surface Sediment Collection Log

Job: HARPERS SHIPYARDS
Job No:
Field Staff: SS / CB
Contractor: GRAVITY

Station: HS-0955
Date: 1-18-22
Sample Method: VVG
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: 39.7
DTM Lead Line: 39.5

Tide Measurements
Time: 10:55
Height: 7.03

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
#1	10:54	632710.71	1734819.71	Y	28	JAWS CLOSE, OVERLYING WATER, FLAT SURFACE

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

- TOP 0.5': WET, LOOSE, BROWN, SILT, BIOTA- SHELLS, PLANT DEBRIS (5/95) SAND/SILT

0.5-BOTTOM: WET, LOOSE, DARK BROWN, SILTY SAND (90/10), FG-MED SAND, SHELL HASH, ORGANIC FIBERS

Sample Depth: 0-12 cm

Sample Containers: 8OZ ARCHIVE + BIOASSAY BAG

Analyses: ARCHIVE + BIOASSAY

Surface Sediment Collection Log

Job: HARRIS SHIPYARDS
Job No:
Field Staff: SS / CB
Contractor: GRAVITY

Station: HS-1055
Date: 1-18-21
Sample Method: VV G
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: —
DTM Lead Line: 40.00

Tide Measurements
Time: 1130
Height: 6.85

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes: SLIGHT SURFACE SLOPE

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
#1	1130	632700.20	1234739.05	Y	19cm	Overlying water, flat surface

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

SAND / SILT

TOP 1": WET, LOOSE, BROWN, SILT (5%), BARK FRAGMENTS, INTACT BOTTLES (5/95)

1" - BOTTOM: WET, LOOSE, SANDY SILT (30/70), GLASS FRAGMENTS, STEEL HASH

Sample Depth: 12 cm

Sample Containers:

Analyses: PAHs, PCBs, METALS, TS, TOC, AMLITHE, BIOASSAY

Surface Sediment Collection Log

Job:
Job No:
Field Staff: SS/CB
Contractor: GRAVITY

Station: HS-1155
Date: 1-18-22
Sample Method: VVG
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: —
DTM Lead Line: 43.1

Tide Measurements
Time: 12:12
Height: 6.79

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
#1	12:12	632803.97	1734667.69	Y	21	OVERLYING WATER, SURFACE INTACT

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

TOP 0.5' = 80% SHELLS/SHELL FRAGMENTS, WET, LOOSE, BROWN, SILT (5/95)
BOTTOM: SNAILS, SHRIMP, LIVE CRABS, STARFISH

0.5 - BOTTOM: WET, LOOSE, DARK BROWN, SANDY SILT (MH) 30/70
SIGNIFICANT SHELL DEBRIS / TRASH

Sample Depth: 0-12 cm

Sample Containers:

Analyses: PAHS, PCBS, METALS, TS, TOC, BEI ASSAY

Surface Sediment Collection Log

Job: HARRIS SHIPYARD | Station: HS-12 SS
Job No: 21007-02.01 | Date: 1-18-22 / 1-19-22
Field Staff: SS / CB | Sample Method: VV G VIA UNDER-DOCK VESSEL
Contractor: GRAVITY | Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder:
DTM Lead Line: 1-18: 7.9 / 1-19: 10.5

1/18 — Tide Measurements
1/19 - 1528
7.39
Time: 1300
Height: 6.97

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes: * NEED "DAMASITE" THE SMALLER GRAB DEVICE FROM GRAVITY TO ACCESS THIS STATION. GOT SMALLER VESSEL ON 1-19-22 TO ATTEMPT SAMPLE FROM UNDER DOCK. VISUALLY CLEARED BY DIVERS

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in) cm	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1/18 - #1	12:12	632803.97	1234667.69	N	NA	HARD SURFACE, GRAB TIPPED (ABOUT 15 FEET E FROM STATION)
1/19 - #2	15:28	~~632315.05~~ 632319.64	~~1234370.94~~ 1234364.34	N	NA	ROCKS IN JAW, NO RECOVERY
#3	15:37	632317.21	1234362.34	N	NA	DEBRIS IN JAW, NO RECOVERY
#4	15:40	632323.84	1234364.81	N	NA	ROCKS IN JAW, NO RECOVERY
#5	15:44	632315.82	1234363.24	Y	7 cm	LOW REC, JAWS SLIGHTLY OPEN
1/19 #6	15:53	632322.16	1234364.58	N	NA	ROCKS IN JAW, NO RECOVERY

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

0-0.25": WET, LOOSE, OLIVE BROWN ~~SILTY~~ GRAVELLY SILT (20, 5, 75), 2-4" SUB ROUND GRAVEL, TRACE SAND. SHELL HASH + SHEEN
0.25-BOTTOM: WET, LOOSE, DARK GREY SANDY SILT w/ SHELL HASH, TRACE SUBRND GRAVELS, F-MED SAND (5/30/65), TRACE ORGANICS, SHEEN, MODERATE SHARP-LIKE ODOR (XYLENES? SOLVENT)

Sample Depth: 0-12 CM

Sample Containers: 12oz, 8oz, 8oz (NO BIOASSAY)

Analyses: PAHs, PCBs, METALS, TS, TOC, ~~DIOXINS~~
0-12 cm

* UNDER DOCK IS LARGE COBBLES/BOULDERS/WOOD AND DEBRIS (WAGON WHEEL). DIVER SAID NO CHANCE AT SAMPLE UNDER DOCK. ATTEMPTING AS CLOSE TO TARGET AS POSSIBLE.

Surface Sediment Collection Log

Job: Harris Ave. Shipyard
Job No: 210007-02.01
Field Staff: NS
Contractor: Gravity

Station: HS-1355
Date: 6/21/22
Sample Method: Van Veen
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: -
DTM Lead Line: 37.8 ft
Mudline Elevation (datum): calculated after sampling

Tide Measurements
Time: -
Height: -

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth (in)	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	14:03	632785.29	1234822.81	Y	17cm	Jaws closed, overlying water
			NS			

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

Wet, soft, dark gray, silt (95%), ~~fine~~ NS fine sand (5%), non-plastic, trace biotal (worms), no odor

Sample Depth: 0-12

Sample Containers: 4x 8oz jars

Analyses: TS/TOC, Metals, PAHs, PCBs

Surface Sediment Collection Log

Job: Harris Ave. Shipyard
Station: HS-145S
Job No: 210007-02-01
Date: 6/21/22
Field Staff: NS
Sample Method: Van Veen
Contractor: Gravity
Proposed Coordinates: Lat.
Long.

Water Height
DTM Depth Sounder: –
DTM Lead Line: 40.8

Tide Measurements
Time: –
Height: –

Sample Acceptability Criteria:
1) Overlying water is present
2) Water has low turbidity
3) Sampler is not overfilled
4) Surface is flat
5) Desired penetration depth

Mudline Elevation (datum): calculated after sampling

Notes:

Grab #	Time	Confirmed Coordinates (datum) NAD 83 (N)	Confirmed Coordinates (datum) NAD 83 (E)	Sample Accept (Y/N)	Recovery Depth ~~(in)~~ cm	Comments: jaws close, good seal, winnowing, overlying water, surface intact, etc
1	14:29	–	–	N	18+ cm	over penetration
2	14:37	–	–	N	18+ cm	over penetration
3	14:49	–	–	N	18+ cm	over penetration
4	14:58	–	–	N	18+ cm	over penetration
5	15:06	632743.15	1234880.91	Y	17.5 cm	surface intact

Sample Description: MAJOR CONSTITUENT GROUP NAME. Moisture content, density/consistency, color, major constituent (%), minor constituents (%), plasticity. Amount and shape of minor constituents (e.g., wood, shells). Biota. Sheen, odor. Structure descriptions

wet, very soft, gray, silt (100%), non-plastic, trace biota (shells), one silver sheen floret (<1 cm diameter), no odor

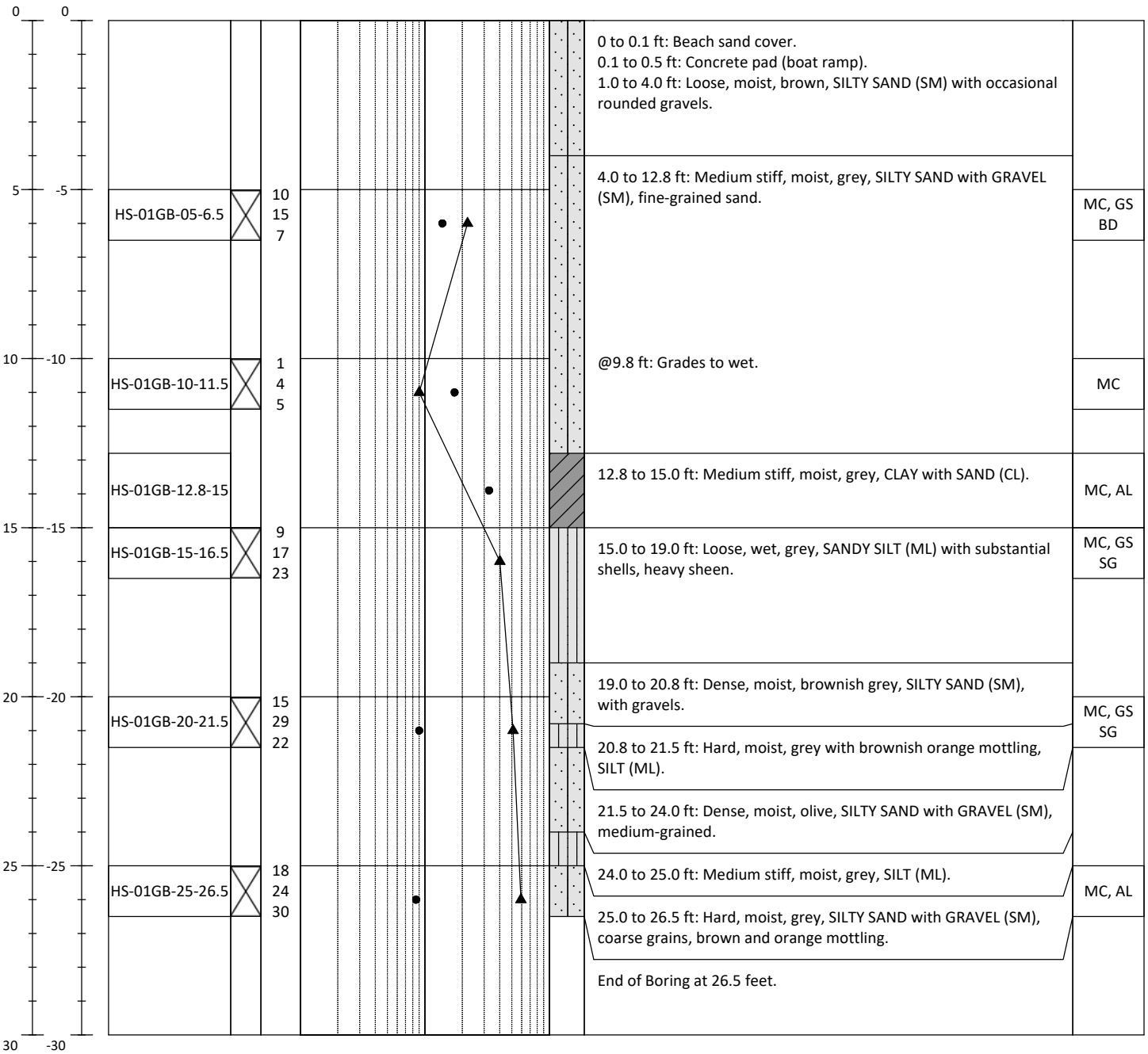
Sample Depth: 0-12 cm

Sample Containers: 4 x 8 oz

Analyses: Metals, TS/TOC, PAHs, PCBs

Soil Boring Log
HS-01GB

Project #: 210007-02.01	Project: Harris Avenue Shipyard Cleanup	Location: Bellingham, Washington
Client: Port of Bellingham	Logged By: Sam Giannakos	N/LAT: **632265.795303** E/LONG: **1234499.842924**
Contractor: Holt Services	Horiz. Datum: Washington State Plane Feet	Collection Date: **4/29/22**
Method: Direct Push	Vert. Datum: NAVD88	Total Depth (ft): **26.5**
Hammer: 140-lb Auto Hammer	Sampler(s): 2-inch OD/1.375-inch ID Split Spoon	Observed Water Table Depth (ft): **N/A**
Hammer Efficiency (%): UNKNOWN	2-inch Dual Tube Liner	Ground Surface Elevation (ft): **X**



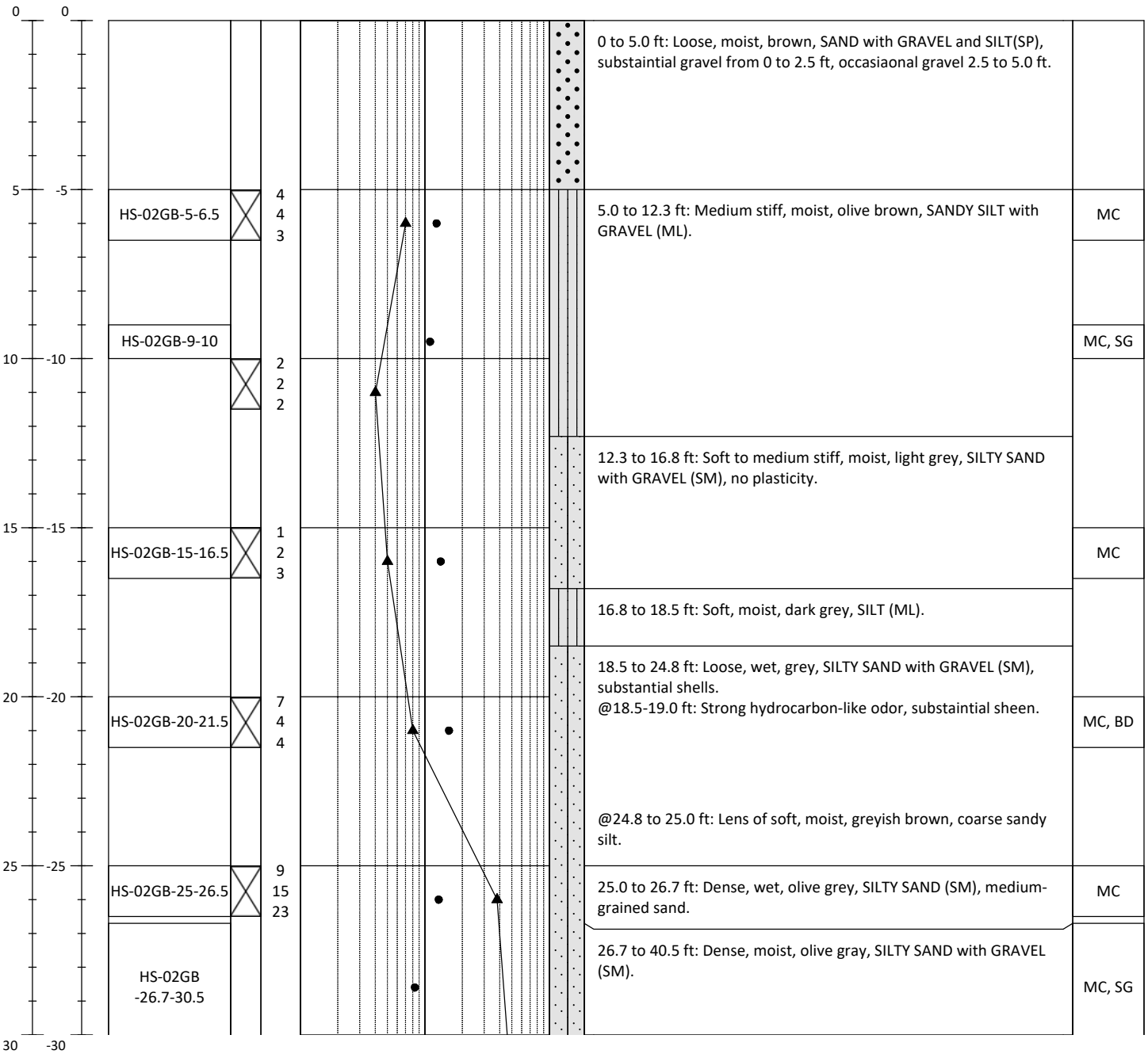
ANCHOR QEA
1201 Third Avenue, Suite 2600
Seattle, WA 98101

SPT N-Value
Moisture Content (%)
Split Spoon

Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.
2) 15-16.5 ft: No recovery in split spoon. Driller reports large gravel in shoe, blow counts unreliable.

Soil Boring Log
HS-02GB

Project #: 210007-02.01	Project: Harris Avenue Shipyard Cleanup	Location: Bellingham, Washington
Client: Port of Bellingham	Logged By: Sam Giannakos	N/LAT: **632273.059396** E/LONG: **1234454.273134**
Contractor: Holt Services	Horiz. Datum: Washington State Plane Feet	Collection Date: **4/28/22**
Method: Direct Push	Vert. Datum: NAVD88	Total Depth (ft): **101.5**
Hammer: 140-lb Auto Hammer	Sampler(s): 2-inch OD/1.375-inch ID Split Spoon	Observed Water Table Depth (ft): **N/A**
Hammer Efficiency (%): UNKNOWN	2-inch Dual Tube Liner	Ground Surface Elevation (ft): **X**



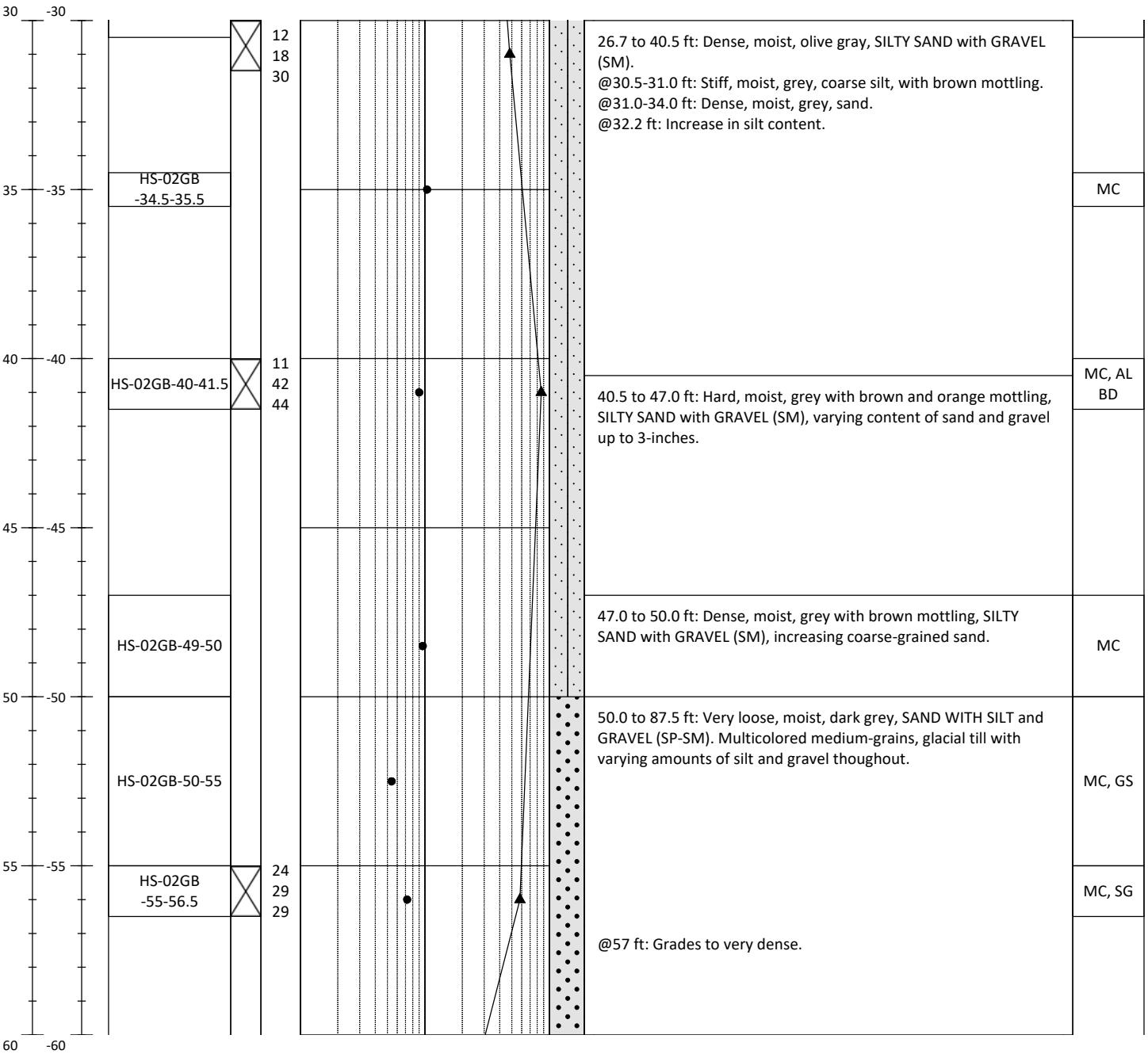
ANCHOR QEA
1201 Third Avenue, Suite 2600
Seattle, WA 98101

SPT N-Value
Moisture Content (%)
Split Spoon

Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.
2) 10-11.5 ft: No recovery in split spoon.Trace silty sand in shoe.

Soil Boring Log
HS-02GB

Project #: 210007-02.01	Project: Harris Avenue Shipyard Cleanup	Location: Bellingham, Washington
Client: Port of Bellingham	Logged By: Sam Giannakos	N/LAT: **632273.059396** E/LONG: **1234454.273134**
Contractor: Holt Services	Horiz. Datum: Washington State Plane Feet	Collection Date: **4/28/22**
Method: Direct Push	Vert. Datum: NAVD88	Total Depth (ft): **101.5**
Hammer: 140-lb Auto Hammer	Sampler(s): 2-inch OD/1.375-inch ID Split Spoon	Observed Water Table Depth (ft): **N/A**
Hammer Efficiency (%): UNKNOWN	2-inch Dual Tube Liner	Ground Surface Elevation (ft): **X**



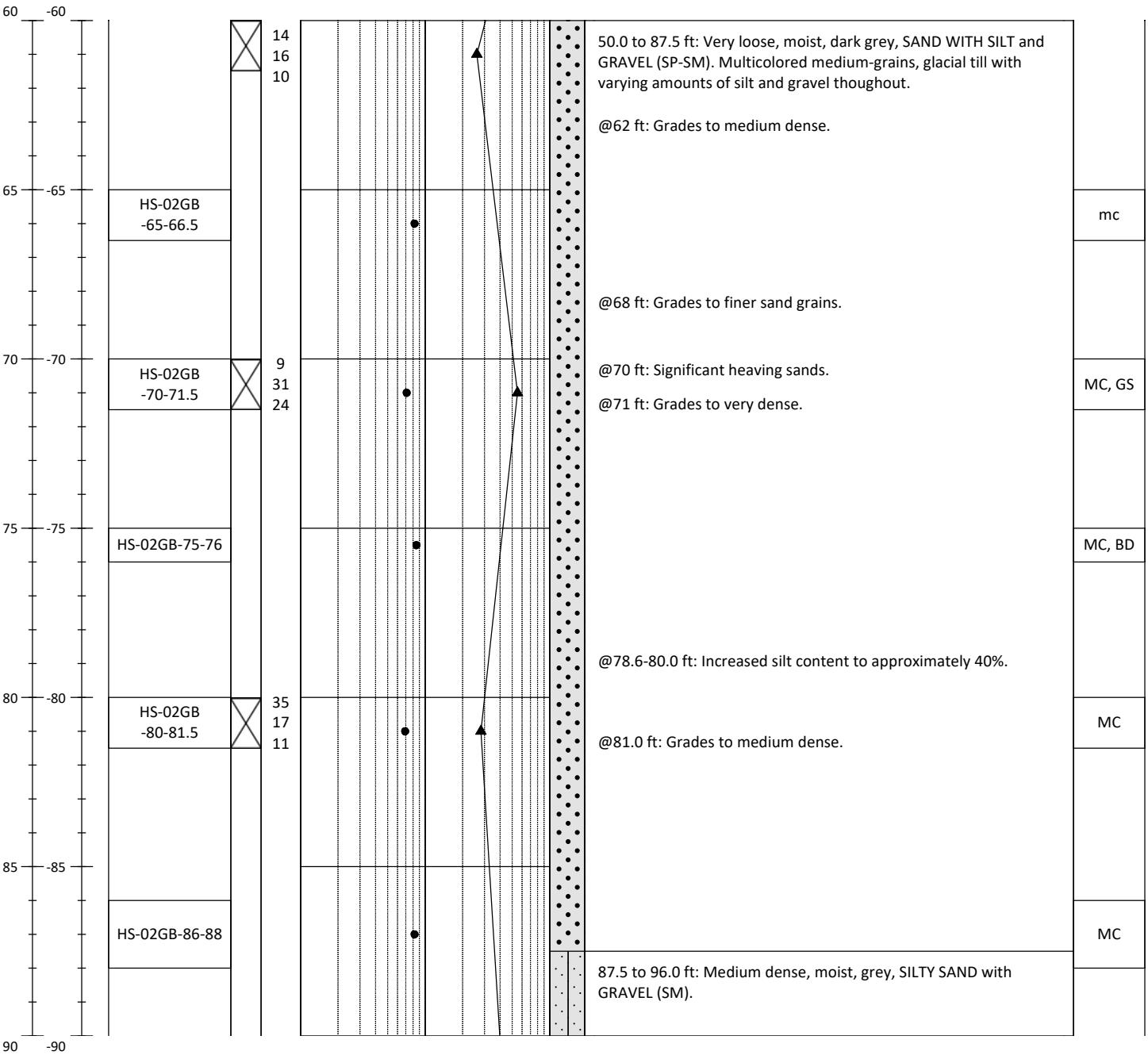
ANCHOR QEA
1201 Third Avenue, Suite 2600
Seattle, WA 98101

▲ SPT N-Value
● Moisture Content (%)
Split Spoon

Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.
2) 10-11.5 ft: No recovery in split spoon.Trace silty sand in shoe.

Soil Boring Log
HS-02GB

Project #: 210007-02.01	Project: Harris Avenue Shipyard Cleanup	Location: Bellingham, Washington
Client: Port of Bellingham	Logged By: Sam Giannakos	N/LAT: **632273.059396** E/LONG: **1234454.273134**
Contractor: Holt Services	Horiz. Datum: Washington State Plane Feet	Collection Date: **4/28/22**
Method: Direct Push	Vert. Datum: NAVD88	Total Depth (ft): **101.5**
Hammer: 140-lb Auto Hammer	Sampler(s): 2-inch OD/1.375-inch ID Split Spoon	Observed Water Table Depth (ft): **N/A**
Hammer Efficiency (%): UNKNOWN	2-inch Dual Tube Liner	Ground Surface Elevation (ft): **X**



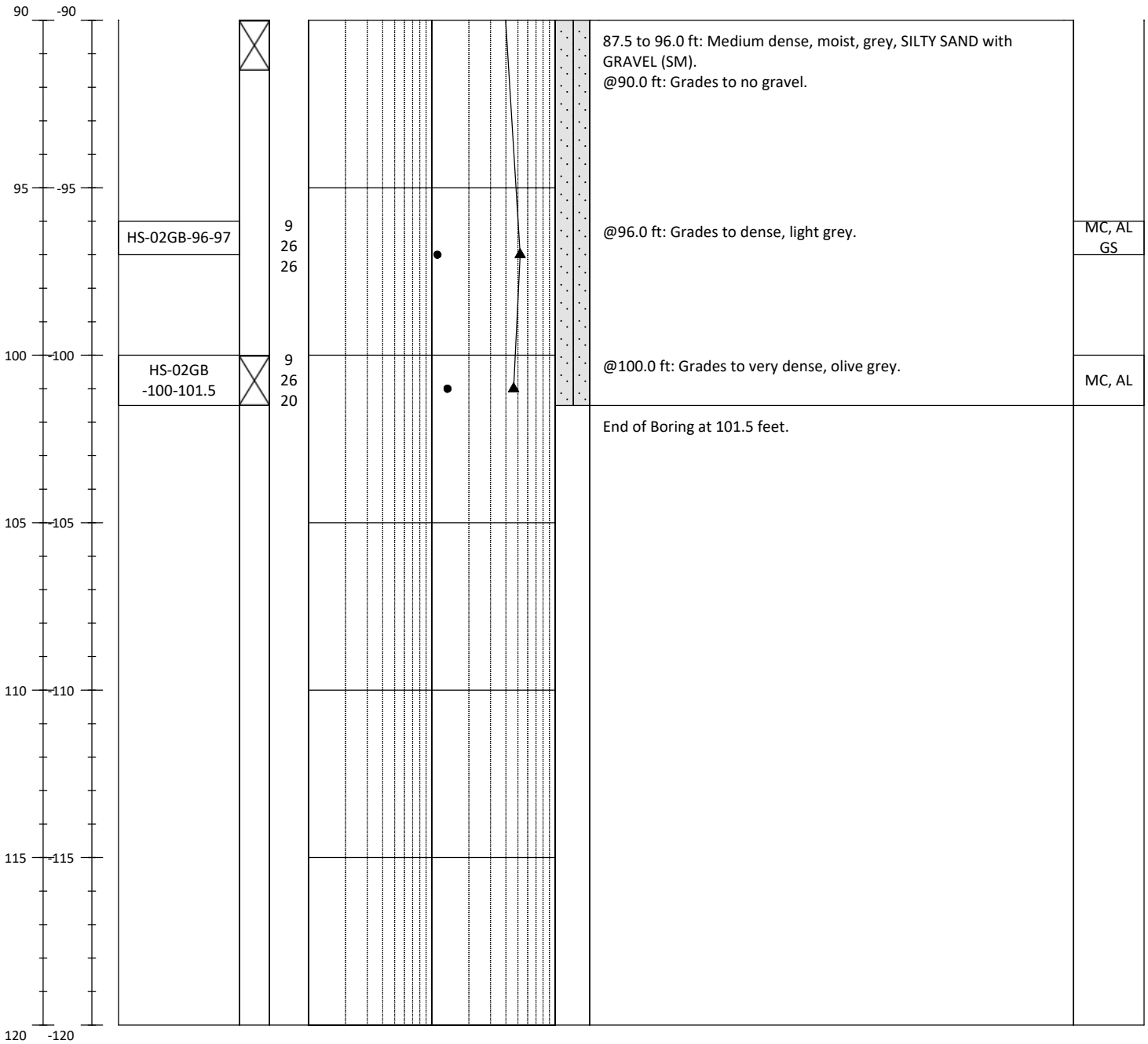
ANCHOR QEA
1201 Third Avenue, Suite 2600
Seattle, WA 98101

▲ SPT N-Value
● Moisture Content (%)
▨ Split Spoon

Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.
2) 10-11.5 ft: No recovery in split spoon.Trace silty sand in shoe.

Soil Boring Log
HS-02GB

Project #: 210007-02.01	Project: Harris Avenue Shipyard Cleanup	Location: Bellingham, Washington
Client: Port of Bellingham	Logged By: Sam Giannakos	N/LAT: **632273.059396** E/LONG: **1234454.273134**
Contractor: Holt Services	Horiz. Datum: Washington State Plane Feet	Collection Date: **4/28/22**
Method: Direct Push	Vert. Datum: NAVD88	Total Depth (ft): **101.5**
Hammer: 140-lb Auto Hammer	Sampler(s): 2-inch OD/1.375-inch ID Split Spoon	Observed Water Table Depth (ft): **N/A**
Hammer Efficiency (%): UNKNOWN	2-inch Dual Tube Liner	Ground Surface Elevation (ft): **X**



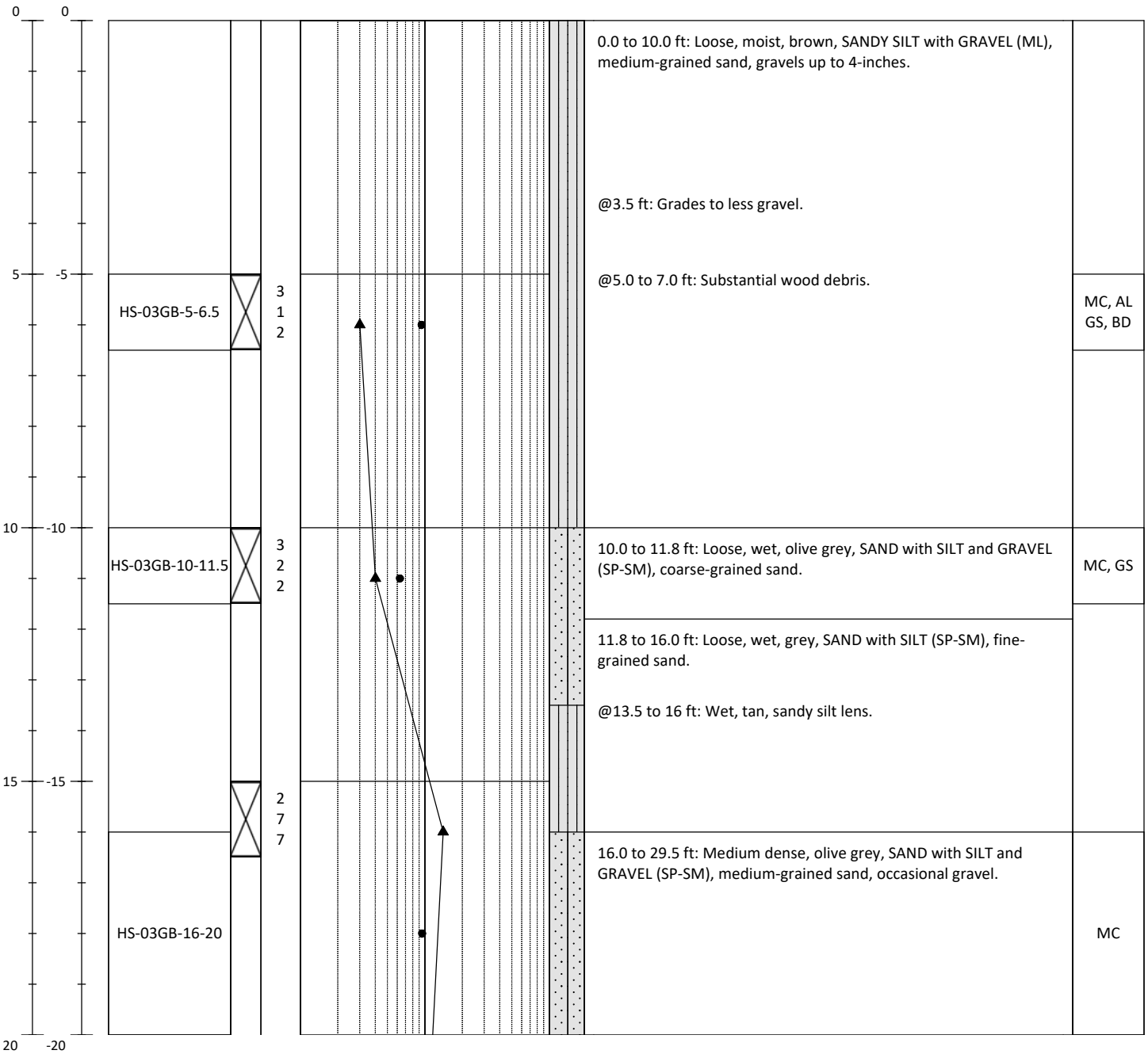
ANCHOR QEA
1201 Third Avenue, Suite 2600
Seattle, WA 98101

▲ SPT N-Value
● Moisture Content (%)
Split Spoon

Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.
2) 10-11.5 ft: No recovery in split spoon.Trace silty sand in shoe.

Soil Boring Log
HS-03GB

Project #: 210007-02.01	Project: Harris Avenue Shipyard Cleanup	Location: Bellingham, Washington
Client: Port of Bellingham	Logged By: Sam Giannakos	N/LAT: **632265.494451** E/LONG: **1234416.846371**
Contractor: Holt Services	Horiz. Datum: Washington State Plane Feet	Collection Date: **4/27/22**
Method: Direct Push	Vert. Datum: NAVD88	Total Depth (ft): **61.5**
Hammer: 140-lb Auto Hammer	Sampler(s): 2-inch OD/1.375-inch ID Split Spoon	Observed Water Table Depth (ft): **N/A**
Hammer Efficiency (%): UNKNOWN	2-inch Dual Tube Liner	Ground Surface Elevation (ft): **X**



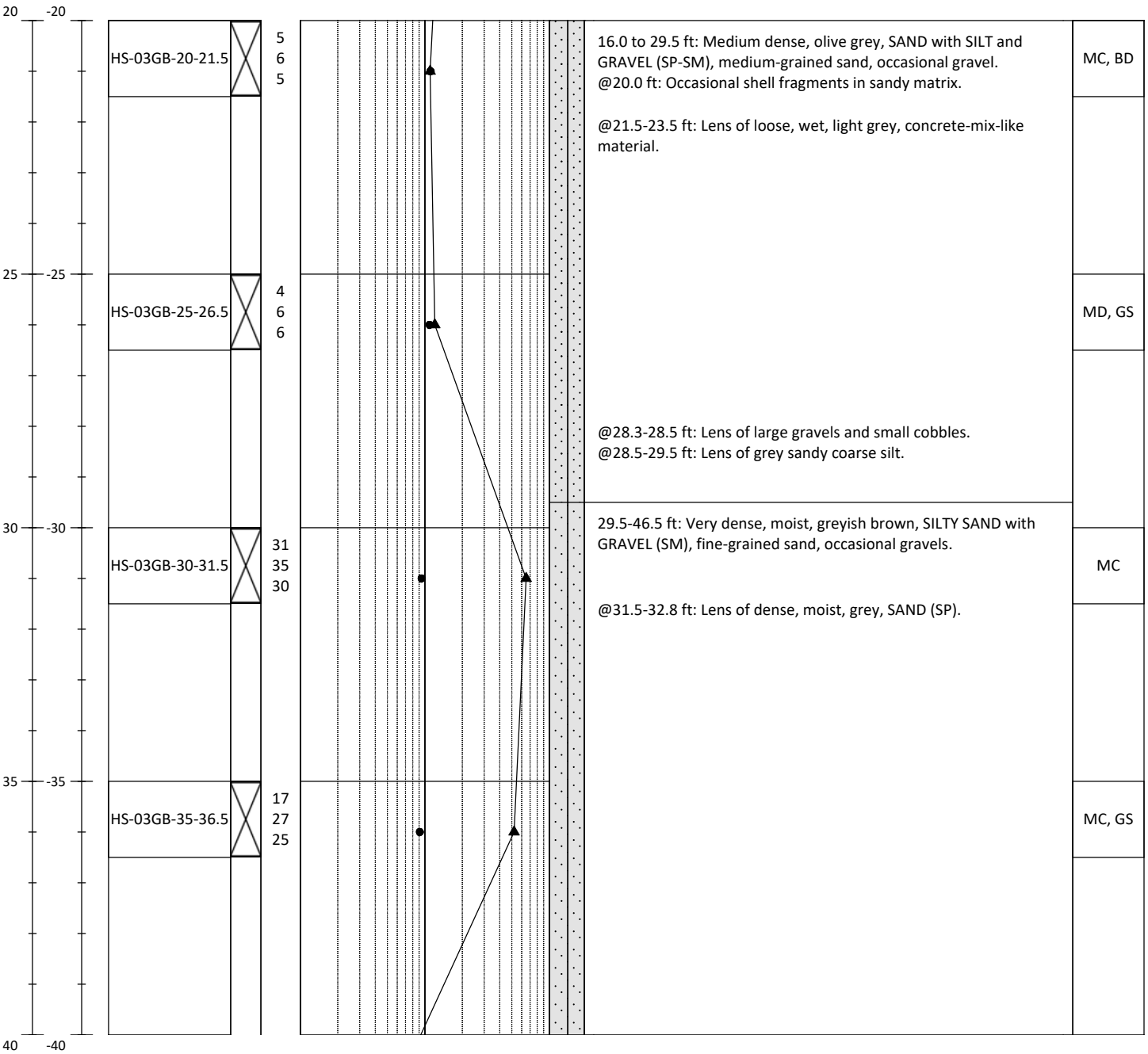
ANCHOR QEA
1201 Third Avenue, Suite 2600
Seattle, WA 98101

SPT N-Value
Moisture Content (%)
Split Spoon

Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.

Soil Boring Log
HS-03GB

Project #: 210007-02.01	Project: Harris Avenue Shipyard Cleanup	Location: Bellingham, Washington
Client: Port of Bellingham	Logged By: Sam Giannakos	N/LAT: **632265.494451** E/LONG: **1234416.846371**
Contractor: Holt Services	Horiz. Datum: Washington State Plane Feet	Collection Date: **4/27/22**
Method: Direct Push	Vert. Datum: NAVD88	Total Depth (ft): **61.5**
Hammer: 140-lb Auto Hammer	Sampler(s): 2-inch OD/1.375-inch ID Split Spoon	Observed Water Table Depth (ft): **N/A**
Hammer Efficiency (%): UNKNOWN	2-inch Dual Tube Liner	Ground Surface Elevation (ft): **X**



ANCHOR QEA
1201 Third Avenue, Suite 2600
Seattle, WA 98101

SPT N-Value
Moisture Content (%)
Split Spoon

Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.

Soil Boring Log
HS-03GB

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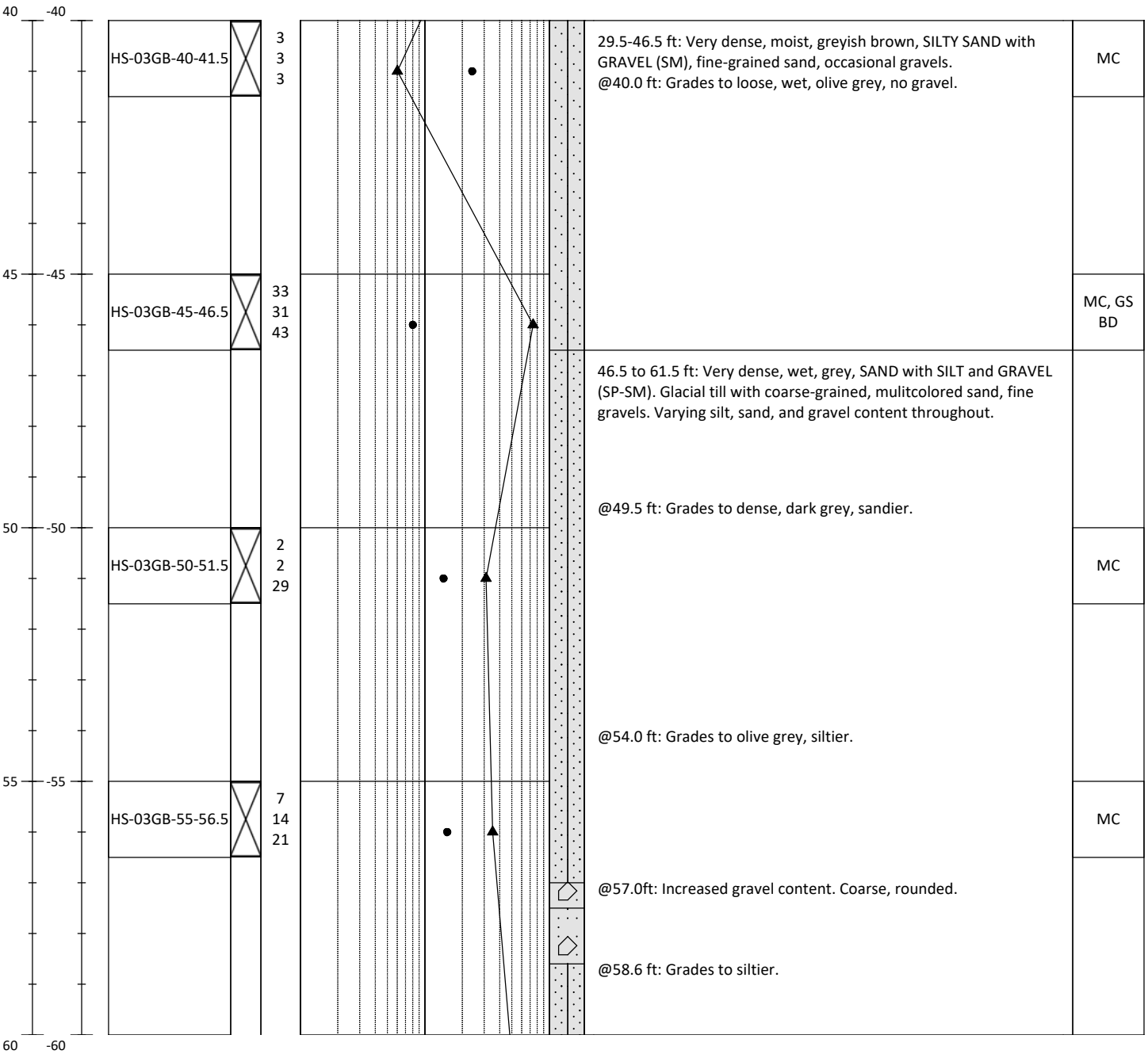

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Seattle, WA 98101

▲ SPT N-Value
● Moisture Content (%)
Split Spoon

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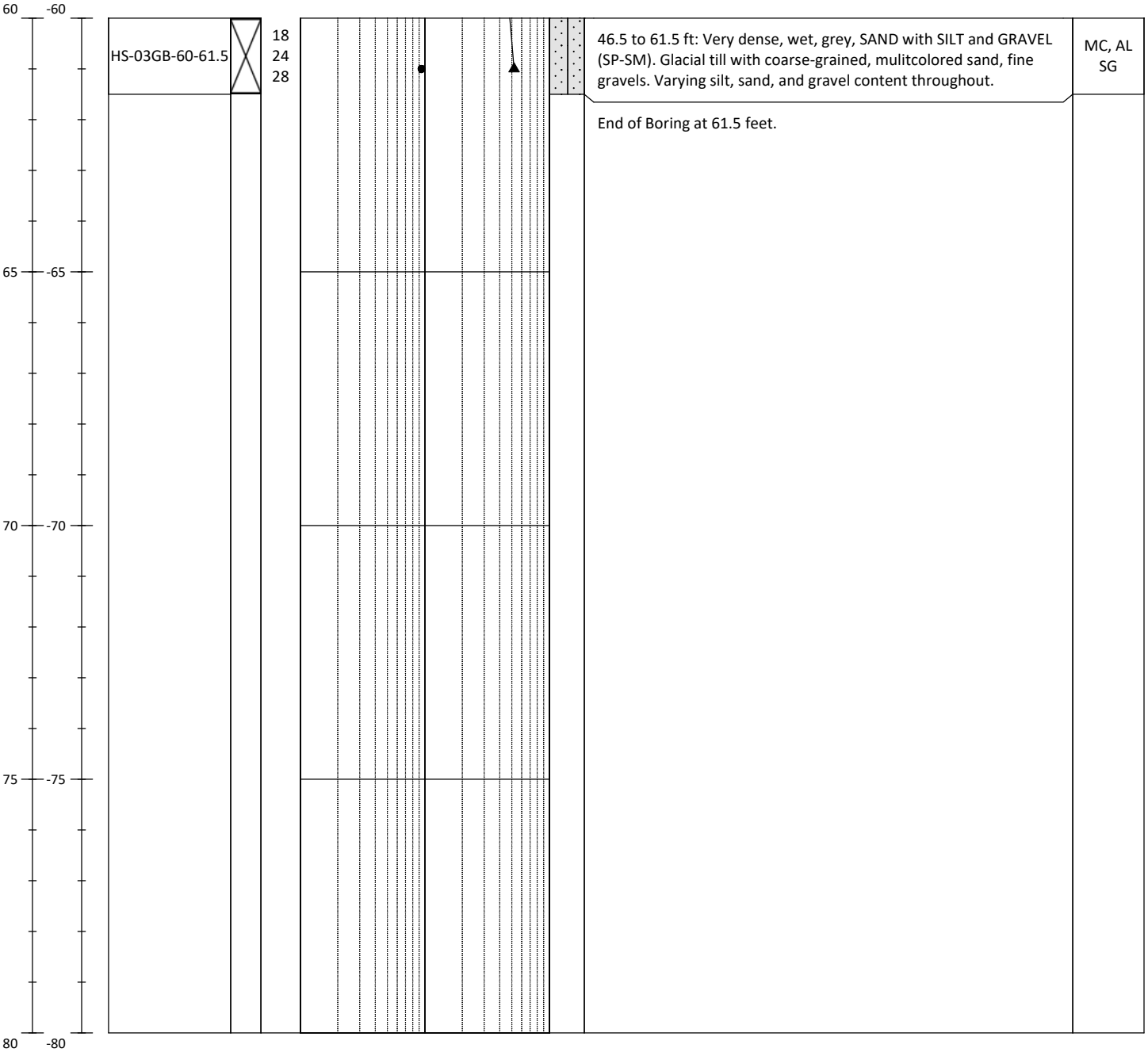

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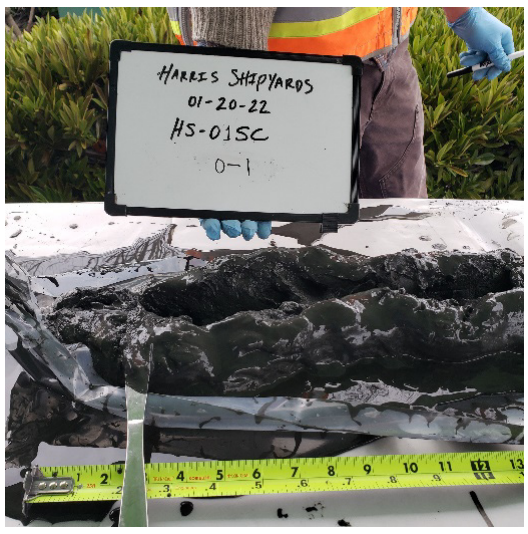
Seattle, WA 98101

▲ SPT N-Value
● Moisture Content (%)
Split Spoon

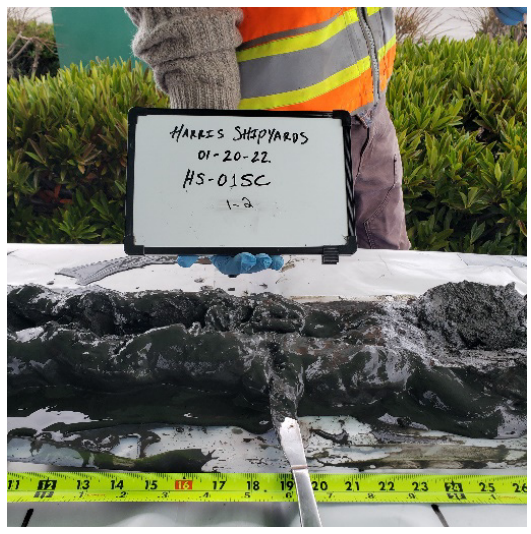
Notes: 1) MC: Moisture Content, GS: Grain Size, AL: Atterberg Limits, SG: Specific Gravity, OC: Organic Content.

Sediment Core Photographs

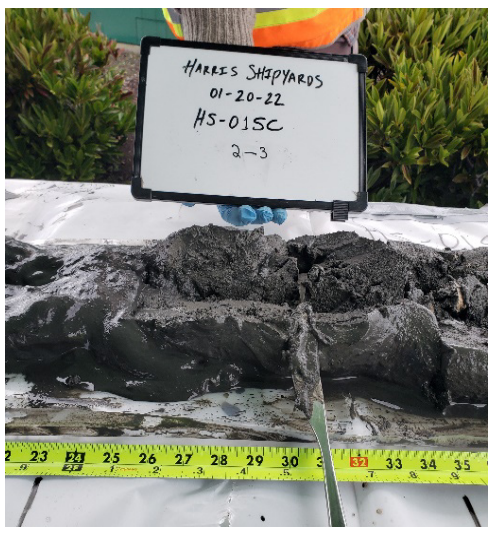
HS-01SC (Attempt 1 of 1, 0.0–1.0 feet)



HS-01SC (Attempt 1 of 1, 1.0–2.0 feet)



HS-01SC (Attempt 1 of 1, 2.0–3.0 feet)



HS-01SC (Attempt 1 of 1, 3.0–4.0 feet)

HS-01SC (Attempt 1 of 1, 4.0–5.0 feet)

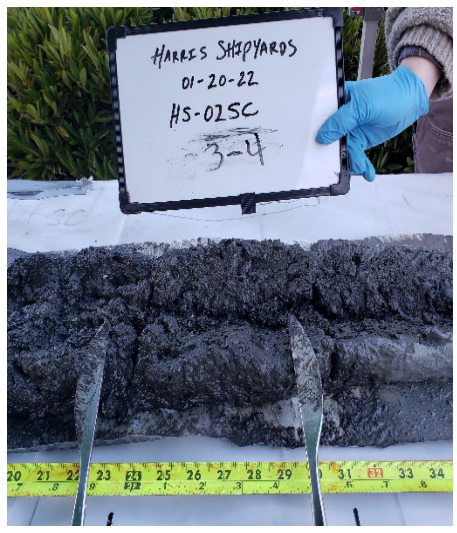
HS-01SC (Attempt 1 of 1, 5.0–6.0 feet)

HS-02SC (Attempt 2 of 2, 0.0–1.0 feet)

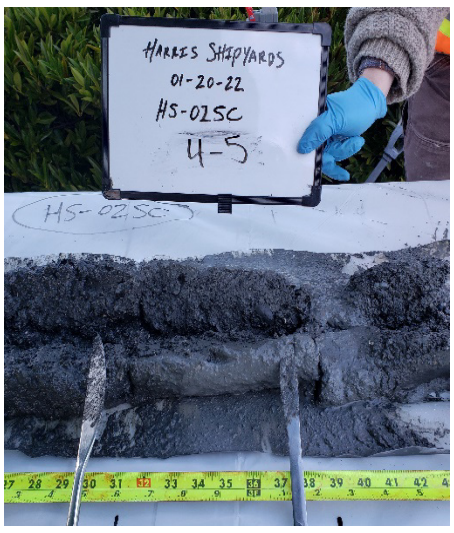
HS-02SC (Attempt 2 of 2, 1.0–2.0 feet)

HS-02SC (Attempt 2 of 2, 2.0–3.0 feet)

HS-02SC (Attempt 2 of 2, 3.0–4.0 feet)



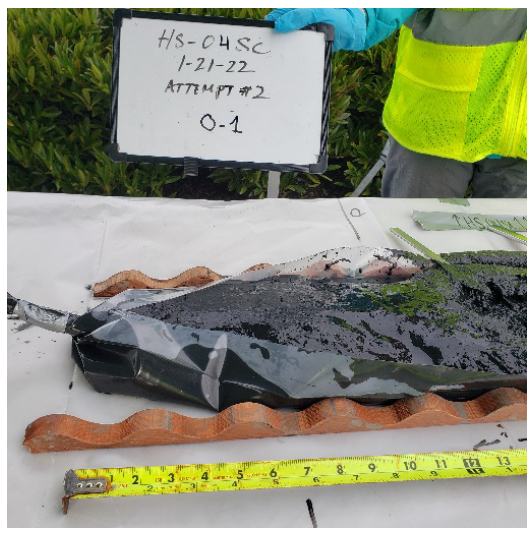
HS-02SC (Attempt 2 of 2, 4.0–5.0 feet)



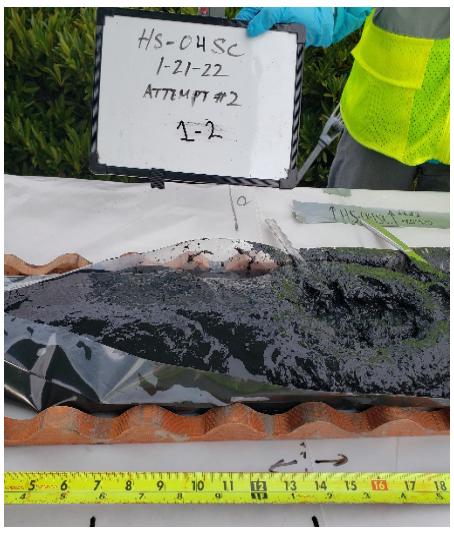
HS-02SC (Attempt 2 of 2, 5.0–6.0 feet)

HS-03SC (Attempt 2 of 2, 0.0–2.2 feet)

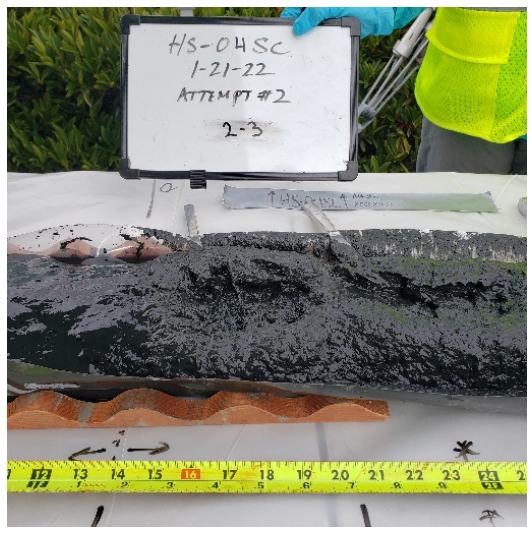
HS-04SC (Attempt 2 of 2, 0.0–1.0 feet)



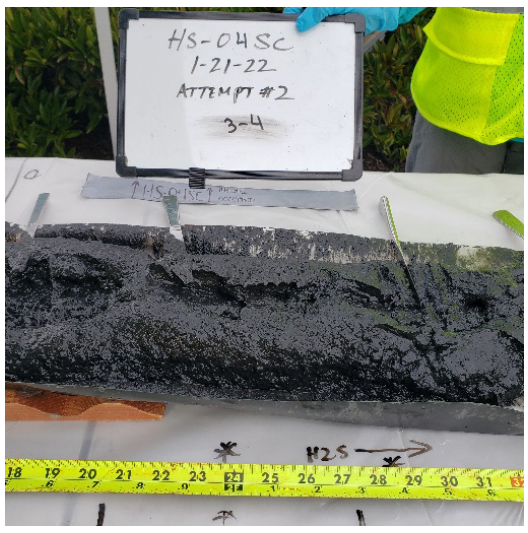
HS-04SC (Attempt 2 of 2, 1.0–2.0 feet)



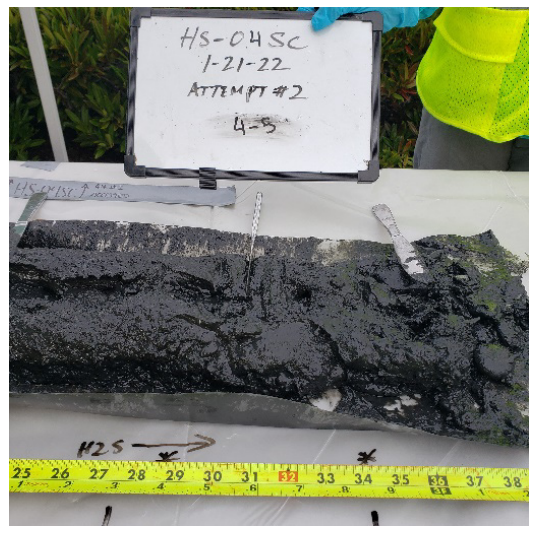
HS-04SC (Attempt 2 of 2, 2.0–3.0 feet)



HS-04SC (Attempt 2 of 2, 3.0–4.0 feet)



HS-04SC (Attempt 2 of 2, 4.0–5.25 feet)



HS-05SC (Attempt 1 of 1, 0.0–1.0 feet)

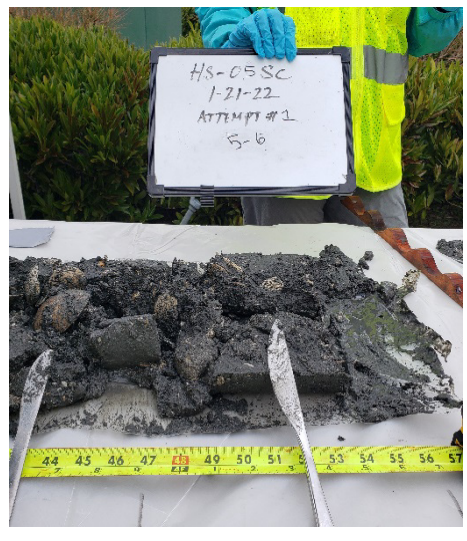
HS-05SC (Attempt 1 of 1, 1.0–2.0 feet)

HS-05SC (Attempt 1 of 1, 2.0–3.0 feet)

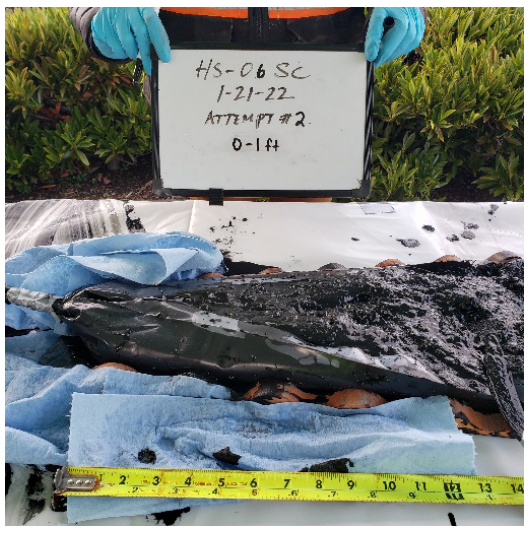
HS-05SC (Attempt 1 of 1, 3.0–4.0 feet)

HS-05SC (Attempt 1 of 1, 4.0–5.0 feet)

HS-05SC (Attempt 1 of 1, 5.0–6.0 feet)



HS-06SC (Attempt 2 of 2, 0.0–1.0 feet)

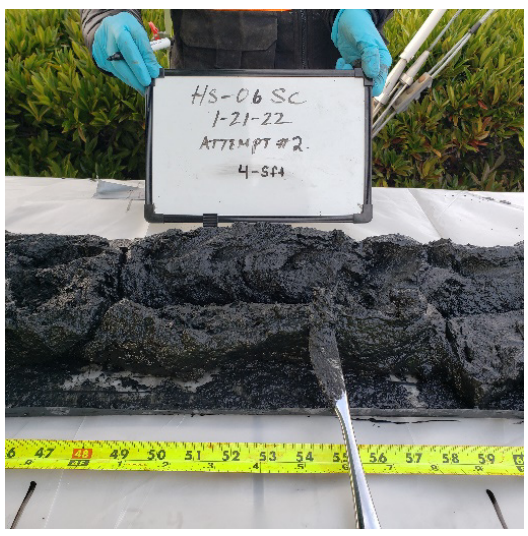


HS-06SC (Attempt 2 of 2, 1.0–2.0 feet)

HS-06SC (Attempt 2 of 2, 2.0–3.0 feet)

HS-06SC (Attempt 2 of 2, 3.0–4.0 feet)

HS-06SC (Attempt 2 of 2, 4.0–5.0 feet)



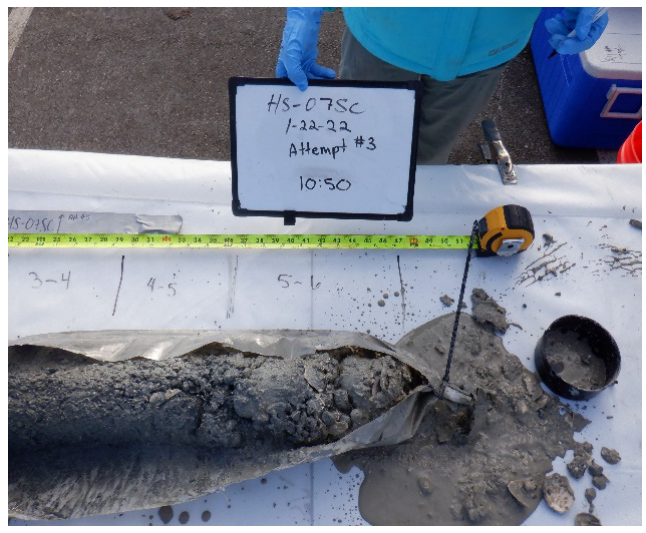
HS-06SC (Attempt 2 of 2, 5.0–6.0 feet)

HS-07SC (Attempt 3 of 3, 0.0–2.0 feet)

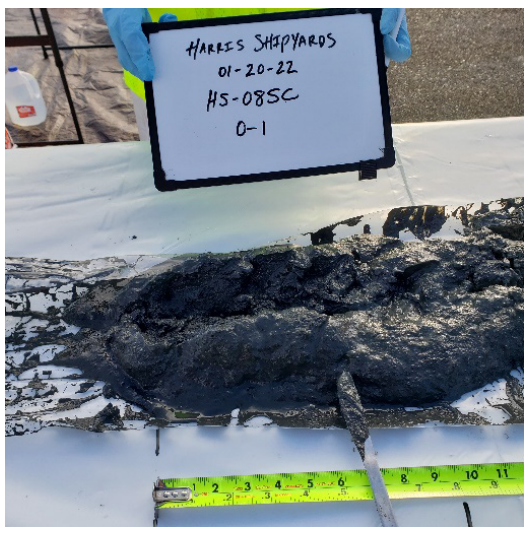
HS-07SC (Attempt 3 of 3, 2.0–4.0 feet)

HS-07SC (Attempt 3 of 3, 4.0–5.0 feet)

HS-07SC (Attempt 3 of 3, 5.0–6.0 feet)



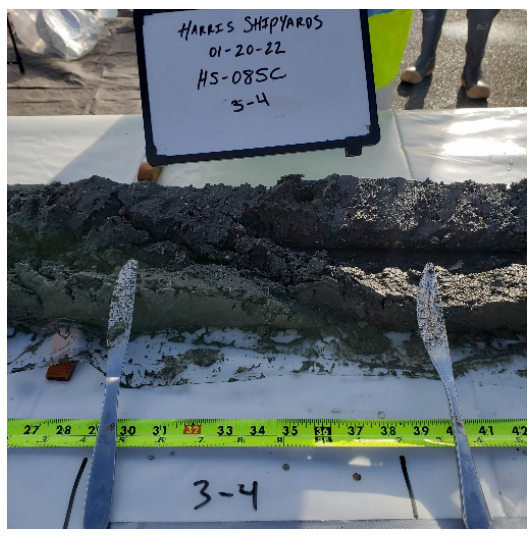
HS-08SC (Attempt 1 of 1, 0.0–1.0 feet)



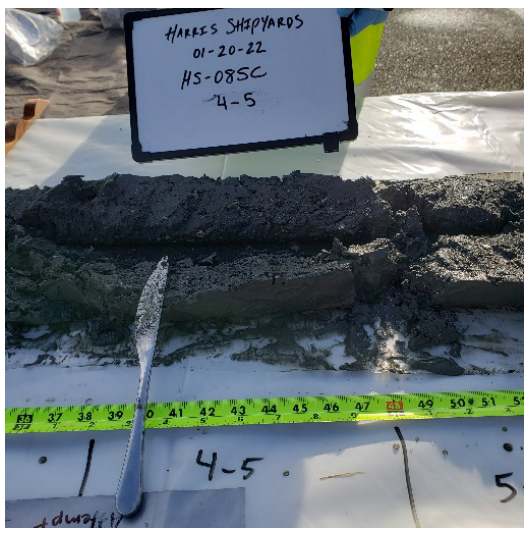
HS-08SC (Attempt 1 of 1, 1.0–2.0 feet)

HS-08SC (Attempt 1 of 1, 2.0–3.0 feet)

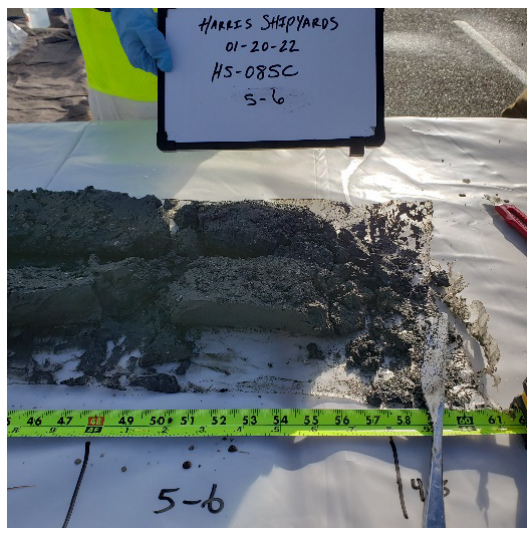
HS-08SC (Attempt 1 of 1, 3.0–4.0 feet)



HS-08SC (Attempt 1 of 1, 4.0–5.0 feet)



HS-08SC (Attempt 1 of 1, 5.0–6.0 feet)



HS-09SC (Attempt 3 of 3, 0.0–2.0 feet)

HS-09SC (Attempt 3 of 3, 2.0–5.0 feet)

HS-09SC (Attempt 3 of 3, 5.0–6.0 feet)

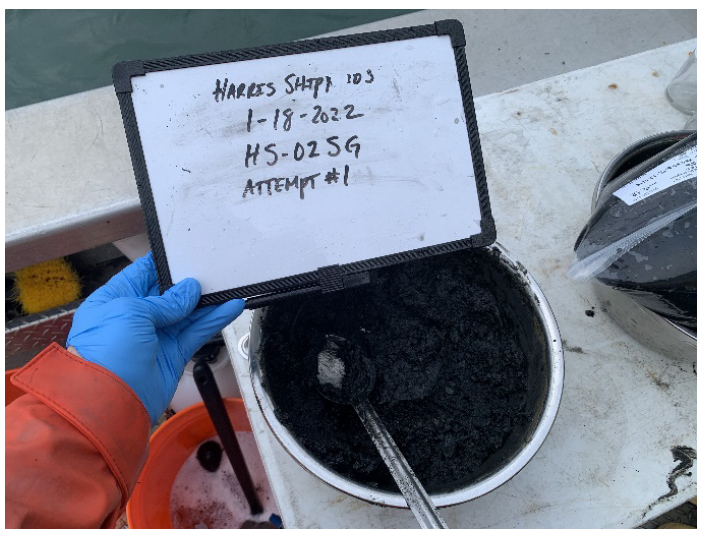
Grab Photographs

HS-01SG (Attempt 2 of 2)

HS-01SG (Attempt 2 of 2, Mixed)

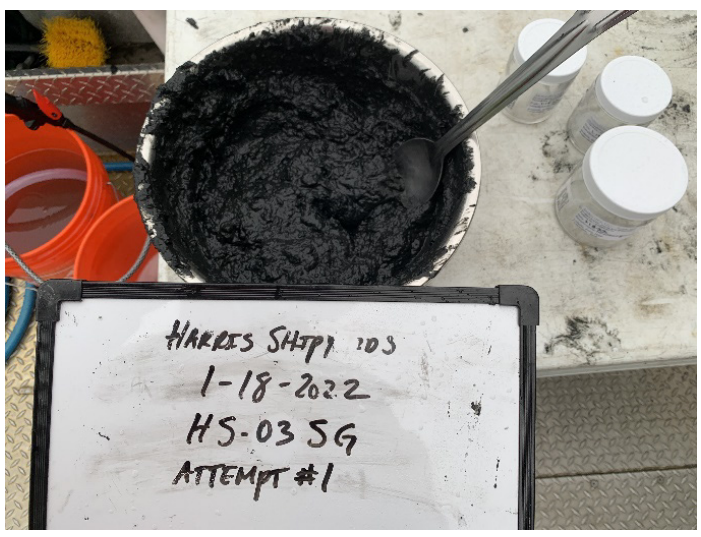
HS-02SG (Attempt 1 of 1)

HS-02SG (Attempt 1 of 1, Mixed)



HS-03SG (Attempt 1 of 1)

HS-03SG (Attempt 1 of 1, Mixed)

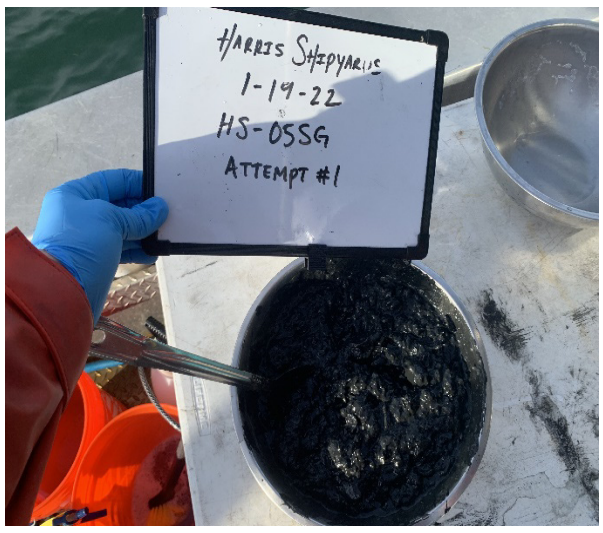


HS-04SG (Attempt 2 of 2)

HS-04SG (Attempt 2 of 2, Mixed)

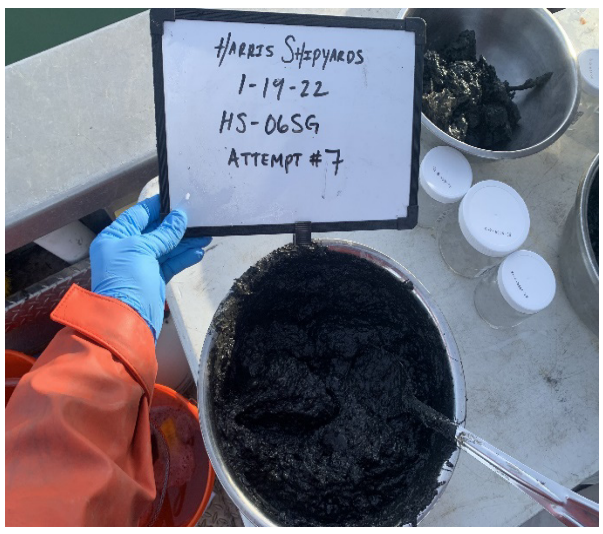
HS-05SG (Attempt 1 of 1)

HS-05SG (Attempt 1 of 1, Mixed)



HS-06SG (Attempt 8 of 8)

HS-06SG (Attempt 8 of 8, Mixed)

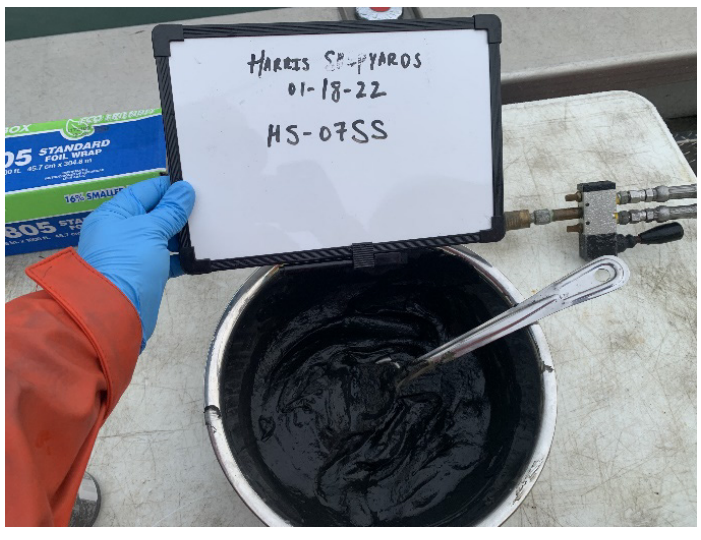


HS-01HA (Attempt 1 of 1)

HS-02HA (Attempt 1 of 1)

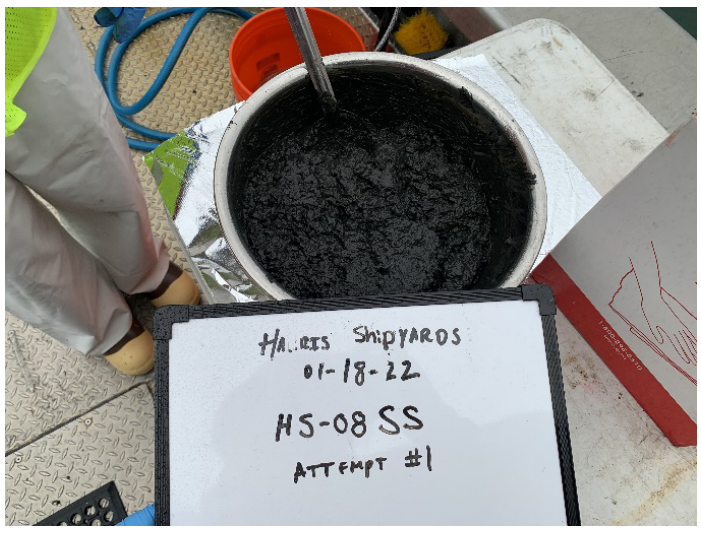
HS-07SS (Attempt 1 of 1)

HS-07SS (Attempt 1 of 1, Mixed)



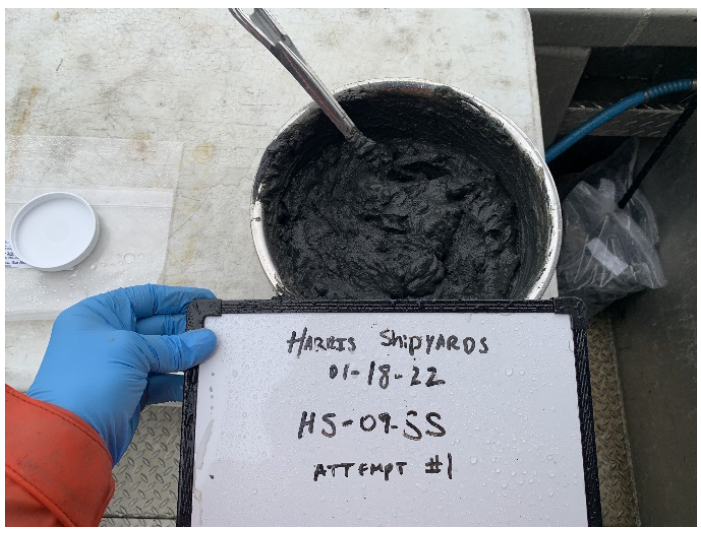
HS-08SS (Attempt 1 of 1)

HS-08SS (Attempt 1 of 1, Mixed)

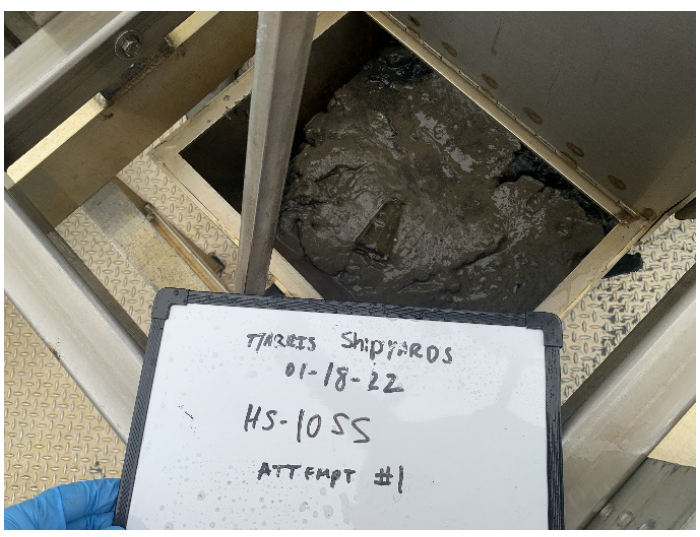


HS-09SS (Attempt 1 of 1)

HS-09SS (Attempt 1 of 1, Mixed)



HS-10SS (Attempt 1 of 1)

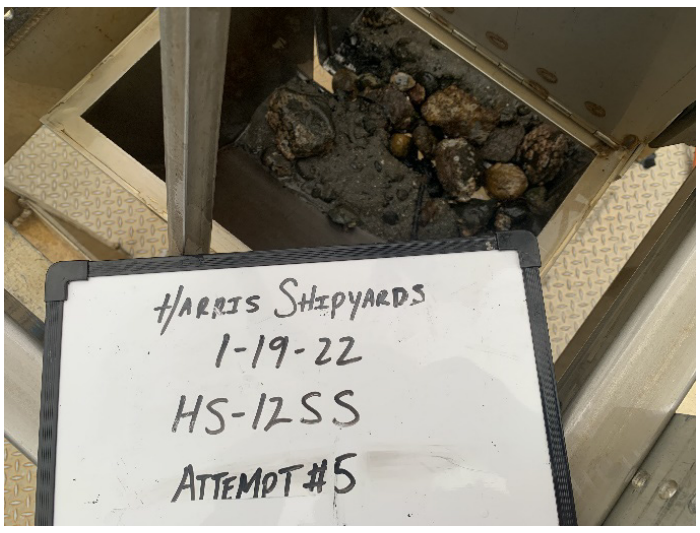


HS-11SS (Attempt 1 of 1, *Cancer productus*)

HS-11SS (Attempt 1 of 1)

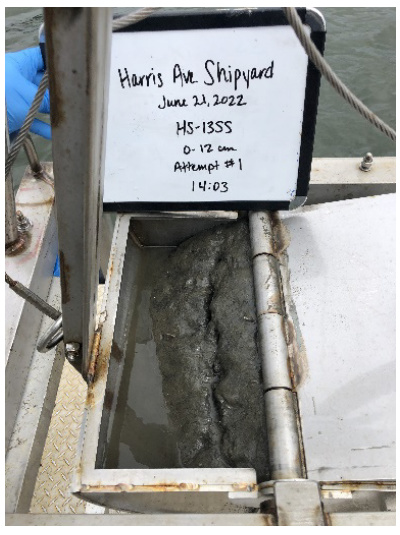
HS-11SS (Attempt 1 of 1, Mixed)

HS-12SS (Attempt 5 of 6)



HS-12SS (Attempt 5 of 6, Sediment Close-Up)

HS-13SS (Attempt 1 of 1)



HS-14SS (Attempt 5 of 5)