ALS Environmental
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August 06, 2018

Analytical Report for Service Request No: K1806431

Gretchen Heavner
Floyd Snider
601 Union Street, Suite 600
Seattle, WA 98101

RE: LDW ENR/AC Pilot Study / LY15160310

Dear Gretchen,

Enclosed are the results of the sample(s) submitted to our laboratory July 10, 2018
For your reference, these analyses have been assigned our service request number **K1806431.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3364. You may also contact me via email at howard.holmes@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Howard Holmes
Project Manager

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Chain of Custody

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SR# K180643 1

PAGE _____ OF _____

Project Name: LDW ENR/AC Pilot Study **Project Number:** LY15160310

Project Manager: Cliff Whitmus - see below for POC **Company:** Wood.

Company/Address: 3500 188th St. SW, Suite 601 **Phone:** 425-921-4023

City, State, Zip: Lynnwood, WA 98037 **E-mail:** cliff.whitmus@woodplc.com

Sampler's Signature: _____

Sample I.D.	Date	Time	LAB ID	Matrix	Number of Containers	TOC - EPA 9060 (duplicate analysis)	MS/Dup				REMARKS
LDW-Y1-SC-ENR-CA-CORE	7/6/18	1045	1	sediment	1	X					
LDW-Y1-SC-ENR-CB-CORE		1100	2	sediment	1	X					
LDW-Y1-SC-ENR-CC-CORE		1120	3	sediment	1	X					
LDW-Y1-SC-ENR+AC-CA-CORE		1205	4	sediment	1	X					
LDW-Y1-SC-ENR+AC-CB-CORE		1245	5	sediment	1	X					
LDW-Y1-SC-ENR+AC-CC-CORE		1300	6	sediment	1	X					

Analysis Requested

TURNAROUND REQUIREMENTS

____ 24 hr ____ 48 hr ____ 5 day

_X_ Standard (21 days)

____ Provide FAX Preliminary Results

Requested Report Date:_____

Invoice Information

P.O. # _____

Bill to: Diane Shannon and Crystal Thimsen at Wood

REPORT REQUIREMENTS

_____ I. Routine Report: Results, Method Blank, Surrogate, as required

_X_ II. Report Dup., MS, MSD as required

_____ III. Data Validation Report (includes raw data)

_____ IV. CLP Deliverable Report

_____ V. EDD

Comments/Special Instructions:

ALS Quote # 42097

POC: Gretchen Heavner - gretchen.heavner@floydsnider.com #206-292-2078

Invoices: email to diane.shannon@woodplc.com and crystal.thimsen@woodplc.com

Prior to taking a sample aliquot, please mix the sample thoroughly. Then take as large an aliquot as possible (preferrably ~20g) to air dry and grind.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Rob Gilmour	Signature: [illegible]	Signature:	Signature:
Printed Name: Rob Gilmour	Printed Name: KMorrow	Printed Name:	Printed Name:
Firm: Wood	Firm: ALS	Firm:	Firm:
Date/Time: 7/9/18 1245	Date/Time: 7/10/18 0950	Date/Time:	Date/Time:

PC 112

Cooler Receipt and Preservation Form

Client Wood E+I / Amec Service Request K18 06431

Received: 7/10/18 Opened: 7/10/18 By: KM Unloaded: 7/10/18 By: KL

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? 1 front

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filec
1.7	1.5	8.1	~~7.8~~ 7.9	-0.2	385		7726 6334 6569	

4. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* Cardboard Box Blue ice
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N

   If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: Blue ice on top of Samples. TB was insulated by b.wrap.

General Chemistry

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Analytical Report

Client:	Wood E&IS (AMEC Lynnwood)	**Service Request:**	K1806431
Project:	LDW ENR/AC Pilot Study/LY15160310	**Date Collected:**	07/6/18
Sample Matrix:	Sediment	**Date Received:**	07/10/18
Analysis Method:	9060	**Units:**	Percent
Prep Method:	Method	**Basis:**	Dry, per Method

Carbon, Total Organic (TOC)

Sample Name	Lab Code	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
LDW-Y1-SC-ENR-CA-CORE	K1806431-001	**0.72**	0.10	1	08/02/18 13:53	8/2/18	
LDW-Y1-SC-ENR-CB-CORE	K1806431-002	**0.55**	0.10	1	08/02/18 13:53	8/2/18	
LDW-Y1-SC-ENR-CC-CORE	K1806431-003	**0.71**	0.10	1	08/02/18 13:53	8/2/18	
LDW-Y1-SC-ENR+AC-CA-CORE	K1806431-004	**0.62**	0.10	1	08/02/18 13:53	8/2/18	
LDW-Y1-SC-ENR+AC-CB-CORE	K1806431-005	**4.02**	0.10	1	08/02/18 13:53	8/2/18	
LDW-Y1-SC-ENR+AC-CC-CORE	K1806431-006	**3.71**	0.10	1	08/02/18 13:53	8/2/18	
Method Blank	K1806431-MB	ND	0.10	1	08/02/18 13:53	8/2/18	U

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QA/QC Report

Client:	Wood E&IS (AMEC Lynnwood)	**Service Request:**	K1806431
Project	LDW ENR/AC Pilot Study/LY15160310	**Date Collected:**	07/06/18
Sample Matrix:	Sediment	**Date Received:**	07/10/18
Analysis Method:	9060	**Units:**	Percent
Prep Method:	Method	**Basis:**	Dry, per Method

Replicate Sample Summary
Carbon, Total Organic (TOC)

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
LDW-Y1-SC-ENR-CA-CORE	K1806431-001DUP	0.10	0.72	0.71	0.715	1	20	08/02/18
LDW-Y1-SC-ENR-CB-CORE	K1806431-002DUP	0.10	0.55	0.55	0.550	<1	20	08/02/18
LDW-Y1-SC-ENR-CC-CORE	K1806431-003DUP	0.10	0.71	0.71	0.710	<1	20	08/02/18
LDW-Y1-SC-ENR+AC-CA-CORE	K1806431-004DUP	0.10	0.62	0.61	0.615	2	20	08/02/18
LDW-Y1-SC-ENR+AC-CB-CORE	K1806431-005DUP	0.10	4.02	3.92	3.97	3	20	08/02/18
LDW-Y1-SC-ENR+AC-CC-CORE	K1806431-006DUP	0.10	3.71	3.75	3.73	1	20	08/02/18

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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dba ALS Environmental

QA/QC Report

Client:	Wood E&IS (AMEC Lynnwood)	**Service Request:**	K1806431
Project:	LDW ENR/AC Pilot Study/LY15160310	**Date Collected:**	07/06/18
Sample Matrix:	Sediment	**Date Received:**	07/10/18
		Date Analyzed:	08/2/18
		Date Extracted:	08/2/18

Duplicate Matrix Spike Summary
Carbon, Total Organic (TOC)

Sample Name:	LDW-Y1-SC-ENR+AC-CA-CORE	**Units:**	Percent
Lab Code:	K1806431-004	**Basis:**	Dry, per Method
Analysis Method:	9060		
Prep Method:	Method		

		Matrix Spike K1806431-004MS			Duplicate Matrix Spike K1806431-004DMS					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Carbon, Total Organic (TOC)	0.62	3.00	2.41	99	2.97	2.40	98	70-122	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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QA/QC Report

Client:	Wood E&IS (AMEC Lynnwood)	**Service Request:**	K1806431
Project:	LDW ENR/AC Pilot Study/LY15160310	**Date Analyzed:**	08/02/18
Sample Matrix:	Sediment	**Date Extracted:**	08/02/18

Lab Control Sample Summary
Carbon, Total Organic (TOC)

Analysis Method:	9060	**Units:**	Percent
Prep Method:	Method	**Basis:**	Dry, per Method
		Analysis Lot:	601044

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1806431-LCS	0.58	0.60	96	72-122