

January 10, 2018

REVISION 1

October 26, 2017

CH2M HILL Plateau Remediation Company
 2420 Stevens Center Place
 P.O. Box 1600
 Richland, WA 99354
 Attn.: Tracey A. Burch

Subject: Geotechnical Laboratory Testing Services, Data Deliverable for SDG # W709049, Rev. 0

Enclosed is the final report on geotechnical analyses performed by RJ Lee Group in conjunction with PBS Engineering and Environmental, Inc. (PBS) for Sample Delivery Group number (SDG #) W709049.

General Set Comments

RJ Lee Group received from CH2M-Hill Plateau Remediation Company (CHPRC) 1 sample to be tested for geotechnical analysis at the Columbia Basin Analytical Laboratories. There are no SIRs associated with this SDG.

The CHPRC sample, in SDG # W709049, has been assigned a PBS Geotechnical Lab Sample number per the below table.

CHPRC Sample #	SDG #	Geotechnical Lab Sample #	Date Processed
B3BX70	W709049	H-0191A	10/24/2017
B3BJ9	W709049	H-0191B	10/24/2017

This project deliverable, provided in Attachment 1, contains the reports of the requested analytical results and a copy of the associated chain of custody for the sample listed above.

The analytical results provided in this deliverable relate only to the items tested. The sample was received in acceptable condition unless otherwise noted in the attached report(s).

I certify that this analytical report is in compliance with the Hanford SOW, both technically and for completeness. Release of the data contained in this hard copy report has been authorized by the Laboratory Director or a designee as verified by the following signature.



Donald Smith
 Laboratory Director, Columbia Basin Analytical Laboratories

10/26/2017

Date

If you have any questions, please feel free to contact us at 509-545-4989 or email at don.smith@rjleegroup.com.

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Attachment 1

PBS Geotechnical Laboratory Testing Results, SDG # W709049,
Dated October 26, 2017

January 10, 2018



October 24, 2017

Mr. Larry Lockrem
RJ Lee Group, Inc.
2710 North 20th Avenue
Pasco, Washington 99301

Via email: llockrem@rjleegroup.com

Regarding: Geotechnical Laboratory Testing Results
CH2M HILL Plateau Remediation
Sample Delivery Group No. W709049
PBS Project No. 63797.000

Dear Mr. Lockrem:

PBS Engineering and Environmental Inc. (PBS) is pleased to present the results of our recent geotechnical laboratory testing in accordance with the request provided with Sample Delivery Group (SDG) number W709049.

PBS performed the following tests in general accordance with the relevant ASTM Standards:

- Grain Size Analysis (ASTM D422)
- Hydraulic Conductivity–Falling Head (ASTM D5084)

We trust this letter meets your current needs. If you have any questions, or wish to further discuss our observations, conclusions, and recommendations, please contact us at 509.942.1600.

Sincerely,



10/24/2017

Adam M. Swenson, PE
Project Geotechnical Engineer

Attachment(s): Report of Laboratory Testing – Grain-size Analysis
Report of Laboratory Testing – Hydraulic Conductivity–Falling Head
Chain of Custody

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**REPORT OF LABORATORY TESTING**

Report to: CH2M-Hill - Plateau Remediation 2420 Stevens Center Place PO Box 1600 Richland, WA 99354	Date: 10/24/2017
	Sample Delivery Group No.: W709049
	Sample Authorization No.: F16-040

Project: CHPRC Laboratory	Project No.: 63797.000
Report of: Grain Size Analysis - Hydrometer (ASTM D422)	Lab Technician: P. Brice

Items Received:

Two samples were provided to us containing soil material obtained by you, the client. PBS performed the following test:

Particle/Grain Size Analysis - Hydrometer (ASTM D422):

Mechanical Grain Size Analyses (wet sieve) were conducted on each of the soil samples to determine their grain size distribution. In addition, hydrometer tests were conducted on portions of the soil samples passing the No. 10 sieve. The results of the mechanical grain size analyses and hydrometer testing are plotted on the attached Figure (Particle Size Analysis Test Results - Hydrometer, pages 1 through 3).

LABORATORY TEST RESULTS**Particle Grain Size Analysis - Hydrometer (ASTM D422) - Sieve Portion**

Customer Sample Number	Laboratory Sample Number	Percent Passing by Sieve Size											
		3-in.	1½-in.	¾-in.	½-in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 140	No. 200
B3BX70	H-0191A	100	100	100	99.8	99.1	98.8	98.8	98.5	82.0	45.7	22.2	11.9
B3BJJ9	H-0191B	100	100	100	99.5	97.6	96.8	96.8	96.4	80.8	45.4	21.7	11.7

SHEET 1 OF 3

REVIEWED BY: A. Swenson, P.E.

January 10, 2018

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**REPORT OF LABORATORY TESTING**

Report to: CH2M-Hill - Plateau Remediation
2420 Stevens Center Place
PO Box 1600
Richland, WA 99354

Date: 10/24/2017
Sample Delivery Group No.: W709049
Sample Authorization No.: F16-040

Project: CHPRC Laboratory

Project No.: 63797.000

Report of: Grain Size Analysis - Hydrometer (ASTM D422)

Lab Technician: P. Brice

Particle/Grain Size Analysis - Hydrometer (ASTM D422):

See page 1 of 3

LABORATORY TEST RESULTS**Particle Grain Size Analysis - Hydrometer (ASTM D422) - Hydrometer Portion**

Laboratory Sample Number	Hydrometer Readings													
	2 min		5min		15 min		30 min		60 min		250 min		1440 min	
	Dia. (mm)	Finer (%)	Dia. (mm)	Finer (%)	Dia. (mm)	Finer (%)	Dia. (mm)	Finer (%)	Dia. (mm)	Finer (%)	Dia. (mm)	Finer (%)	Dia. (mm)	Finer (%)
H-0191A	0.036	5.2	0.023	4.3	0.013	4.3	0.009	3.5	0.007	3.3	0.003	1.8	0.001	0.4
H-0191B	0.037	5.3	0.023	3.6	0.014	2.8	0.01	2.8	0.007	2.8	0.003	1.6	0.001	0.8

SHEET 2 OF 3

REVIEWED BY: A. Swenson, P.E.

January 10, 2018

REVISION 1



CHPRC - GEOTECHNICAL LABORATORY

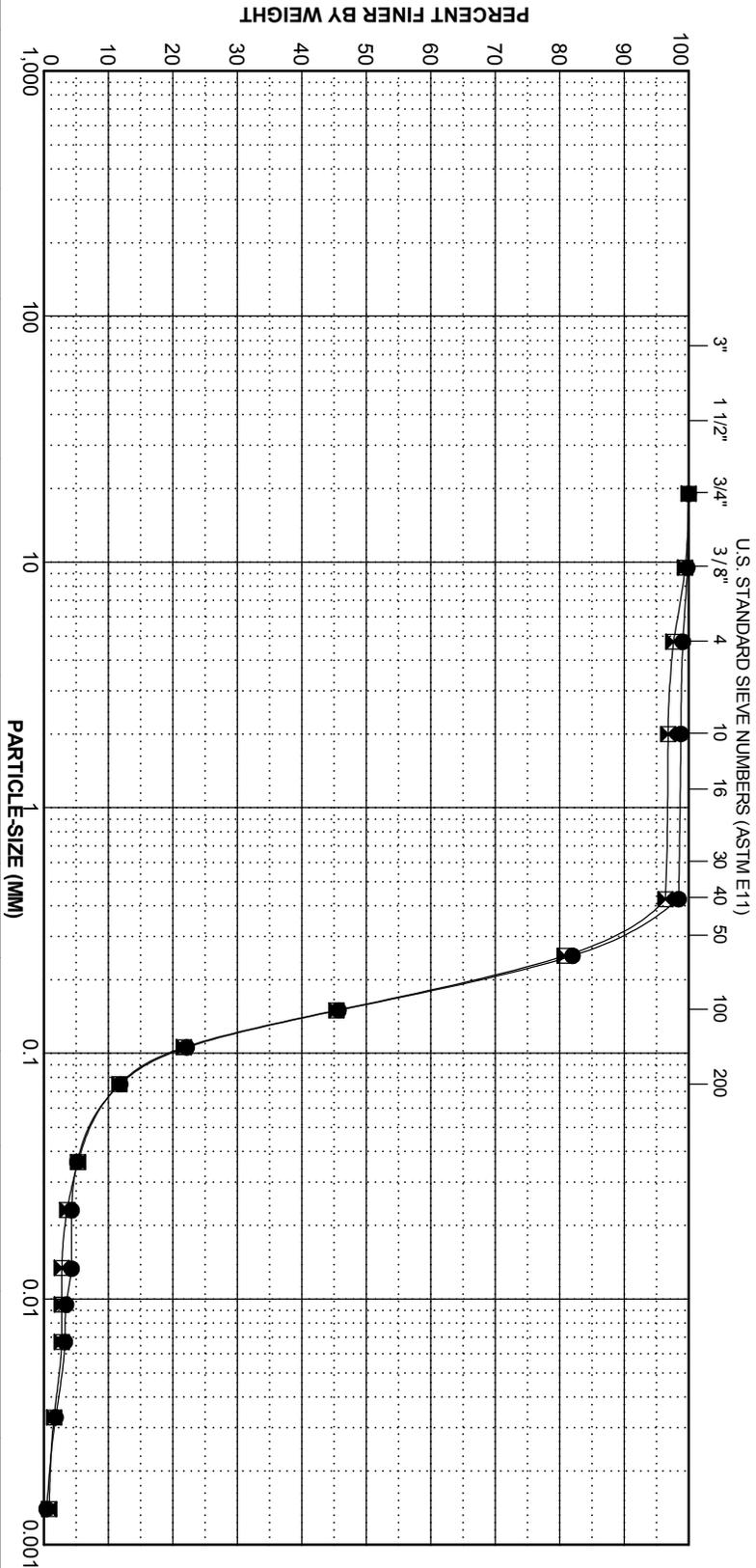
PARTICLE-SIZE ANALYSIS TEST RESULTS

PBS PROJECT NUMBER:
63797

PARTICLE-SIZE ANALYSIS-RJ LEE GRP 63797 RESULTS.GPJ PBS DATA\TPL_GEOGDT PRINT DATE: 10/24/17 8PG

TEST METHOD: ASTM C136

BOULDERS	COBBLES	GRAVEL			SAND			FINES		
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY		



KEY	EXPLORATION NUMBER	SAMPLE NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (PERCENT)	D60 (MM)	D50 (MM)	D30 (MM)	D10 (MM)	D5 (MM)	GRAVEL (PERCENT)	SAND (PERCENT)	FINES (PERCENT)
●	H-191A	B3BX70	91.2	17	0.2	0.2	0.1	0.06	0.03	1	87	12
☒	H-191B	B3BJ9	91.7	18	0.2	0.2	0.1	0.06	0.03	2	86	12

Columbia Basin Analytical Laboratories | 2710 North 20th Avenue, Pasco, WA 99301 | 509.545.4989

WWW.RJLEEGROUP.COM

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**REPORT OF LABORATORY TESTING**

Report to:	CH2M-Hill - Plateau Remediation 2420 Stevens Center Place PO Box 1600 Richland, WA 99354	Date:	10/24/2017
		Sample Delivery Group No.:	W709049
		Sample Authorization No.:	F16-040

Project:	CHPRC Laboratory	Project No.:	63797.000
Report of:	Hydraulic conductivity - Falling Head (ASTM D5084)	Lab Tech:	P. Brice

Items Received:

One sample was provided to us containing soil material obtained by you, the client.
PBS performed the following test:

Hydraulic Conductivity - Falling Head (ASTM D5084).

The hydraulic conductivity of the representative soil was determined in the laboratory using the above referenced samples. The samples were prepared for the permeameter and all the required measures were taken. Air was evacuated from the samples and were then saturated with low mineral content water. Once air was evacuated from the sample, the water volume outflow was measured and recorded over time (t). This time was greater than 9 seconds unless measured to the nearest 0.1 second.

LABORATORY TEST RESULTS**Hydraulic Conductivity - Falling Head (ASTM D5084)**

Customer Sample Number	Laboratory Sample Number	Date of Analysis	Length of specimen, L (cm)	Specimen area, A (cm ²)	Total discharge time, t (sec)	Head loss across specimen, h (cm)	Hydraulic conductivity, k (cm/s)
B3BJJ9	H-0191B	10/22/2017	9.47	44.44	360	6.3	7.04E-05

SHEET 1 OF 1

REVIEWED BY: Adam Swenson, P.E.

SAMPLE ISSUE RESOLUTION (SIR) REPORT	SIR Number: SIR18-0359 Rev. Number: 0 Date Initiated: 01/10/2018
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<u>SAMPLE EVENT INFORMATION</u>	
SAF NUM(S):	F16-040
LABORATORY:	RJL-GT

<u>SAMPLING INFORMATION</u>	
NUMBER OF SAMPLES:	1
SAMPLE NUMBERS:	B3BJJ9
SAMPLE MATRIX:	SOIL
SDG NUM(S):	W709049

<u>ISSUE BACKGROUND</u>	
CLASS:	Sample Management Issues
TYPE:	Addition of Analyses
DESCRIPTION:	Corrections due to errors on chains. D5084_HYDRAULIC CONDUCTIVITY should be added to sample B3BJJ9. D5084_HYDRAULIC CONDUCTIVITY should be canceled on B3BX70.

<u>RESOLUTION</u>	
PROPOSED RESOLUTION:	D5084_HYDRAULIC CONDUCTIVITY should be added to sample B3BJJ9. D5084_HYDRAULIC CONDUCTIVITY should be canceled on B3BX70.

FINAL RESOLUTION:	Accept proposed resolution.
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SUBMITTED BY:	
TOLE, KM _____	01/10/2018 _____
ACCEPTED BY:	
NAGEL, SE _____	01/10/2018 _____

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F16-040-167	PAGE 1 OF 1
COLLECTOR MIKE ESPARZA CHPRC	COMPANY CONTACT LYNCH, SA	TELEPHONE NO. 373-5586	PROJECT COORDINATOR LYNCH, SA	PRICE CODE 8H	DATA TURNAROUND 30 Days / 30 Days
SAMPLING LOCATION 15, I-005 DUP	PROJECT DESIGNATION 100-HR-3 Long Term & Interim Action Monitoring - Soil	FIELD LOGBOOK NO. 14NF-N-045-6-54	ACTUAL SAMPLE DEPTH 89.23 to 94.23	COA 304343	METHOD OF SHIPMENT GOVERNMENT VEHICLE
ICESTR NO.	OFFSITE PROPERTY NO. NA			BILL OF LADING/AIR BILL NO. NA	ORIGINAL
SHIPPED TO PLATE - GEOTECHNICAL NA					

MATRIX* A = Air D = Drum L = Liquids DS = Drum Solids L = Liquid O = Oil S = Soil SE = Sediment T = Tissue V = Vegetation W = Walker WI = Wipe X = Other	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/LATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	PRESERVATION None	HOLDING TIME 6 Months	TYPE OF CONTAINER Split Spoon Liner	NO. OF CONTAINER(S) 1	VOLUME 1000g	SPECIAL HANDLING AND/OR STORAGE NA	SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS
SAMPLE NO. B3BLJ9	MATRIX* SOIL	SAMPLE DATE 09/11/17	SAMPLE TIME 1147					

*Liner E
91.73' to 92.23'*

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM CHPRC SSU-1	DATE/TIME 09/11/17	RECEIVED BY/STORED IN SSU-1	DATE/TIME 09/11/17	TRVL-17-163; ** All requests for Geotechnical Parameters will be given a unique HEIS sample number and be assigned to a separate COC. In addition, all split spoon sleeves will be properly stored until authorized for shipment. ** Laboratory shall perform (1) D2434_PERMEABILITY; COMMON; D422_PARTICLE SIZE (Dry Sieve); COMMON;	
RELINQUISHED BY/REMOVED FROM Janelle Zunker CHPRC	DATE/TIME SEP 12 2017 1027	RECEIVED BY/STORED IN Janelle Zunker CHPRC	DATE/TIME SEP 12 2017 8100		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		

LABORATORY SECTION RECEIVED BY

FINAL SAMPLE DISPOSITION DISPOSAL METHOD

PRINTED ON 8/1/2017 FSR ID = FSR46343 TRVL NUM = TRVL-17-163

A-6003-618 (REV 2)

January 10, 2018

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		FIG-040-258	PAGE 1 OF 1
COLLECTOR	MIKE ESPARZA CHPRC	COMPANY CONTACT	LYNCH, SA 373-5586	PROJECT COORDINATOR	LYNCH, SA
SAMPLING LOCATION	CHPRC	PROJECT DESIGNATION	100-HR-3 Long Term & Interim Action Monitoring - Soil	PRICE CODE	8H
DATE	09/15, 1-005 DUP	FIELD LOGBOOK NO.	44F-N-645-6-54	AIR QUALITY	<input type="checkbox"/> 30 Days / 30 Days
ISF CHEST NO.	N/A	ACTUAL SAMPLE DEPTH	89.23 to 94.23	METHOD OF SHIPMENT	GOVERNMENT VEHICLE
STIPPED TO	NO LEE - GEOTECHNICAL	OFFSITE PROPERTY NO.	N/A	BILL OF LADING/AIR BILL NO.	N/A

MATRIX*	SOIL	PRESERVATION	None
NO. OF CONTAINER(S)	1	HOLDING TIME	None
VOLUME	1000g	TYPE OF CONTAINER	Split Spoon Liner
SPECIAL HANDLING AND/OR STORAGE	NA	SAMPLE ANALYSIS	D5084, HYDRDA LINC CONDUCTIVITY : COMMON;
SAMPLE NO.	B3BXT0	SAMPLE DATE	09/11/17
		SAMPLE TIME	1147

Liner F
91.23' to 91.73'

January 10, 2018

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	TRVL-17-163; ** All requests for Geotechnical Parameters will be given a unique HEIS sample number and be assigned to a separate COC. In addition, all split spoon sleeves will be properly stored until authorized for shipment. ** Laboratory shall perform the Particle Size (Dry Sieve) analysis to determine if they should proceed with Permeability by D2434 or Hydraulic Conductive by D5084.
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME