January 10, 2018 REVISION 1

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

October 5, 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 # W708100, 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 #) W708100.

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 # W708100, has been assigned a PBS Geotechnical Lab Sample number per the below table.

CHPRC Sample #	SDG #	Geotechnical Lab Sample #	Date Processed
B3BX59	W708100	H-0181	10/03/2017

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.

10/05/2017

Donald Smith
Laboratory Director, Columbia Basin Analytical Laboratories

Date

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

Attachment 1

PBS Geotechnical Laboratory Testing Results, SDG # W708100,
Dated October 5, 2017

January 10, 2018

REVISION 1

October 3, 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. W708100
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 W708100.

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,

10/03/2017

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

January 10, 2018 REVISION 1

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

REPORT OF LABORATORY TESTING

Report to:	CH2M-Hill - Plateau Remediation 2420 Stevens Center Place PO Box 1600 Richland, WA 99354	**Date:** **Sample Delivery Group No.:** **Sample Authorization No.:**	10/3/2017 W708100 F16-040
Project:	CHPRC Laboratory	**Project No.:**	63797.000
Report of:	Grain Size Analysis - Hydrometer (ASTM D422)	**Lab Technician:**	P. Brice

Items Received:
One sample was 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 mechnical 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.	⅜-in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 140	No. 200
B3BX59	H-0181	100	97.3	86.8	73.5	65.3	62.7	62.7	62.7	61.3	38.1	17.7	10.7

SHEET 1 OF 3 REVIEWED BY: A. Swenson, P.E.

January 10, 2018 REVISION 1

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

REPORT OF LABORATORY TESTING

Report to:	CH2M-Hill - Plateau Remediation 2420 Stevens Center Place PO Box 1600 Richland, WA 99354	**Date:** **Sample Delivery Group No.:** **Sample Authorization No.:**	10/3/2017 W708100 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-0181	0.036	5.5	0.023	4.3	0.013	3.1	0.010	2.5	0.007	1.9	0.003	1.1	0.001	0.5

SHEET 2 OF 3 REVIEWED BY: A. Swenson, P.E.

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

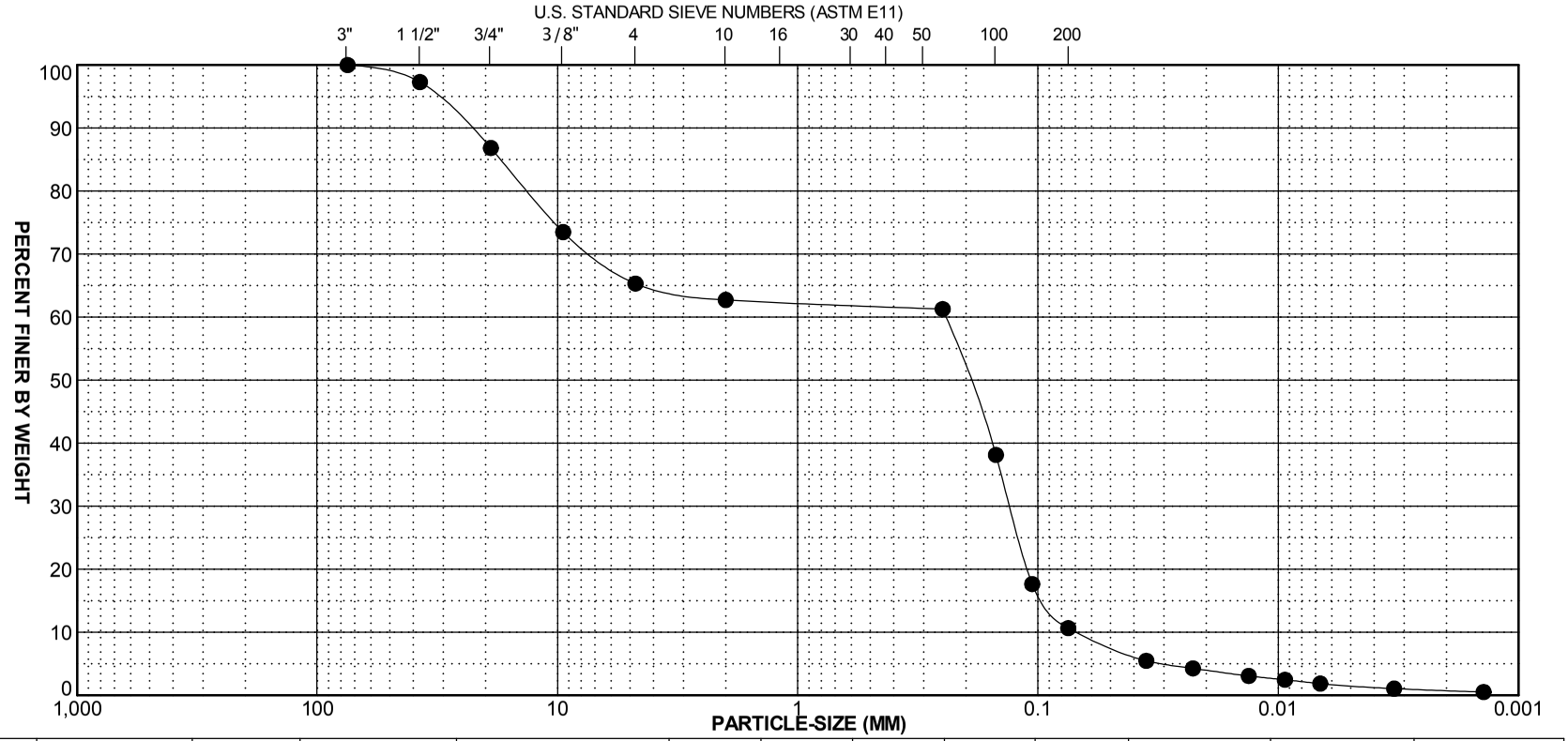
PARTICLE-SIZE ANALYSIS TEST RESULTS

CHPRC - GEOTECHNICAL LABORATORY

PBS PROJECT NUMBER: 63797

TEST METHOD: ASTM D422

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-181	B3BX59	200.4	25	0.2	0.2	0.1	0.07	0.03	35	55	11

January 10, 2018 REVISION 1

RJ LEE GROUP
DELIVERING SCIENTIFIC RESOLUTION

REPORT OF LABORATORY TESTING

Report to:	CH2M-Hill - Plateau Remediation 2420 Stevens Center Place PO Box 1600 Richland, WA 99354	**Date:** **Sample Delivery Group No.:** **Sample Authorization No.:**	10/3/2017 W708100 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)
B3BX59	H-0181	10/2/2017	10.01	43.49	360	30.0	2.35E-05

SHEET 1 OF 1 REVIEWED BY: Adam Swenson, P.E.

SAMPLE ISSUE RESOLUTION (SIR) REPORT

SIR Number: SIR18-0356
Rev. Number: 0
Date Initiated: 01/10/2018

SAMPLE EVENT INFORMATION

SAF NUM(S): F16-040

LABORATORY: RJL-GT

SAMPLING INFORMATION

NUMBER OF SAMPLES: 1

SAMPLE NUMBERS: B3BX59

SAMPLE MATRIX: SOIL

SDG NUM(S): W708100

ISSUE BACKGROUND

CLASS: Sample Management Issues

TYPE: Addition of Analyses

DESCRIPTION: D422_PARTICLE SIZE should be added to sample B3BX59.
Sample B3BK26 will be canceled as based on the particle size measurements the sample requires D5084 Hydraulic Conductivity and not D2434 Permeability.

RESOLUTION

PROPOSED RESOLUTION: Add D422_PARTICLE SIZE should be added to sample B3BX59.

FINAL RESOLUTION: Accept proposed resolution

SUBMITTED BY:

TOLE, KM 01/10/2018

ACCEPTED BY:

NAGEL, SE 01/10/2018

January 10, 2018 REVISION 1

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F16-040-231	PAGE 1 OF 1
COLLECTOR: Ed Kauer, CHPRC	COMPANY CONTACT: LYNCH, SA	TELEPHONE NO.: 373-5586	PROJECT COORDINATOR: LYNCH, SA	PRICE CODE: 8H	DATA TURNAROUND: 30 Days / 30 Days
SAMPLING LOCATION: C9716, I-011	PROJECT DESIGNATION: 100-HR-3 Long Term & Interim Action Monitoring - Soil		SAF NO.: F16-040	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-645-6	ACTUAL SAMPLE DEPTH: 199.92 to 200.42 FT	COA: 304343	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: RI LEE - GEOTECHNICAL	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS: *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SPECIAL HANDLING AND/OR STORAGE: NA

PRESERVATION	None
HOLDING TIME	None
TYPE OF CONTAINER	Split Spoon Liner
NO. OF CONTAINER(S)	1
VOLUME	1000g
SAMPLE ANALYSIS	D5084_HYRDRAULIC CONDUCTIVITY : COMMON;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B3BX59	SOIL	8-10-17	11 57	✓

14.1°C

~~W708101~~
08/21/17
W 708100

COPY

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Ed Kauer CHPRC	DATE/TIME: AUG 10 2017 1330	RECEIVED BY/STORED IN: SSU-1	DATE/TIME: AUG 10 2017 1330
RELINQUISHED BY/REMOVED FROM: SSU-1	DATE/TIME: AUG 14 2017 0700	RECEIVED BY/STORED IN: Lesly Wall /CHPRC	DATE/TIME: AUG 14 2017 0700
RELINQUISHED BY/REMOVED FROM: Lesly Wall /CHPRC	DATE/TIME: AUG 14 2017 0930	RECEIVED BY/STORED IN: RS Lee	DATE/TIME: AUG 14 2017 0930
RELINQUISHED BY/REMOVED FROM: J. Grissmerson	DATE/TIME: 09/22/17 1335	RECEIVED BY/STORED IN: Patrick Brice PBS	DATE/TIME: 09/22/17 1335
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

SPECIAL INSTRUCTIONS

TRVL-17-165; ** 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 perfo

D422 - Particle Size

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

PRINTED ON 7/31/2017 FSR ID = FSR47666 TRVL NUM = TRVL-17-165 A-6003-618 (REV 2)

REVISION 1 January 10, 2018

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F16-040-201	PAGE 1 OF 1
COLLECTOR: Ed Kauer, CHPRC	COMPANY CONTACT: LYNCH, SA	TELEPHONE NO.: 373-5586	PROJECT COORDINATOR: LYNCH, SA	PRICE CODE: 8H	DATA TURNAROUND
SAMPLING LOCATION: C9716, I-011	PROJECT DESIGNATION: 100-HR-3 Long Term & Interim Action Monitoring - Soil		SAF NO.: F16-040	AIR QUALITY ☐	30 Days / 30 Days
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-645-6	ACTUAL SAMPLE DEPTH: 200.42 to 200.92 FT	COA: 304343	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: RJ LEE - GEOTECHNICAL	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

W708100 9 of

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS		
A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other	*Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/IATA 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.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B3BK26	SOIL	8-10-17	1157	✓

W708100

14.2°C

COPY

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Ed Kauer, CHPRC	DATE/TIME: AUG 10 2017 1330	RECEIVED BY/STORED IN: SSU-1	DATE/TIME: AUG 10 2017 1330
RELINQUISHED BY/REMOVED FROM: SSU-1	DATE/TIME: AUG 14 2017 0700	RECEIVED BY/STORED IN: Lesly Wall /CHPRC	DATE/TIME: AUG 14 2017 0700
RELINQUISHED BY/REMOVED FROM: Lesly Wall /CHPRC	DATE/TIME: AUG 14 2017 0930	RECEIVED BY/STORED IN: per Lee Gray, Anna Wochnik	DATE/TIME: AUG 14 2017 0930
RELINQUISHED BY/REMOVED FROM: J. Grimerson / J. [illegible]	DATE/TIME: 09/22/17 1535	RECEIVED BY/STORED IN: Patricia Brice, PBS	DATE/TIME: 09/22/17 1335
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

SPECIAL INSTRUCTIONS

TRVL-17-165; ** 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 perfo
(1) D2434_PERMEABILITY: COMMON; ~~D422_PARTICLE SIZE (Dry~~ Sieve): COMMON;

Cancelled analysis not performed
10/04/17

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

PRINTED ON 7/31/2017 FSR ID = FSR47666 TRVL NUM = TRVL-17-165 A-6003-618 (REV 2)