

November 3, 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 # W707078, Rev. 1**

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 #) W707078.

**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 # W707078, has been assigned a PBS Geotechnical Lab Sample number per the below table.

CHPRC Sample #	SDG #	Geotechnical Lab Sample #	Date Processed
B3BK04	W707078	H-0174	10/02/2017

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.



11/03/2017

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](mailto:don.smith@rjleegroup.com).

Attachment 1

PBS Geotechnical Laboratory Testing Results, SDG #W707078,  
Dated November 3, 2017

January 10, 2018



October 2, 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. W707078  
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 W707078.

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

- Grain Size Analysis (ASTM D422)
- Permeability of Granular Soils–Constant Head (ASTM D2434)

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,



10/02/2017

Adam M. Swenson, PE  
Project Geotechnical Engineer

Attachment(s): Report of Laboratory Testing – Grain-size Analysis  
Report of Laboratory Testing – Permeability of Granular Soils–Constant Head  
Chain of Custody

**REPORT OF LABORATORY TESTING**

<b>Report to:</b> CH2M-Hill - Plateau Remediation 2420 Stevens Center Place PO Box 1600 Richland, WA 99354	<b>Date:</b> 10/2/2017 <b>Sample Delivery Group No.:</b> W707078 <b>Sample Authorization No.:</b> F16-040
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<b>Project:</b> CHPRC Laboratory	<b>Project No.:</b> 63797.000
<b>Report of:</b> Grain Size Analysis - Hydrometer (ASTM D422)	<b>Lab Technician:</b> 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 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
B3BK04	H-0174	100	67.3	35.9	21.7	15.3	11.5	10.8	10.2	10.0	9.7	9.4	8.8

**REPORT OF LABORATORY TESTING**

<b>Report to:</b> CH2M-Hill - Plateau Remediation 2420 Stevens Center Place PO Box 1600 Richland, WA 99354	<b>Date:</b> 10/2/2017 <b>Sample Delivery Group No.:</b> W707078 <b>Sample Authorization No.:</b> F16-040
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<b>Project:</b> CHPRC Laboratory	<b>Project No.:</b> 63797.000
<b>Report of:</b> Grain Size Analysis - Hydrometer (ASTM D422)	<b>Lab Technician:</b> 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-0174	0.027	5.4	0.019	4.1	0.012	3.1	0.008	2.6	0.006	2.3	0.003	1.6	0.001	0.8



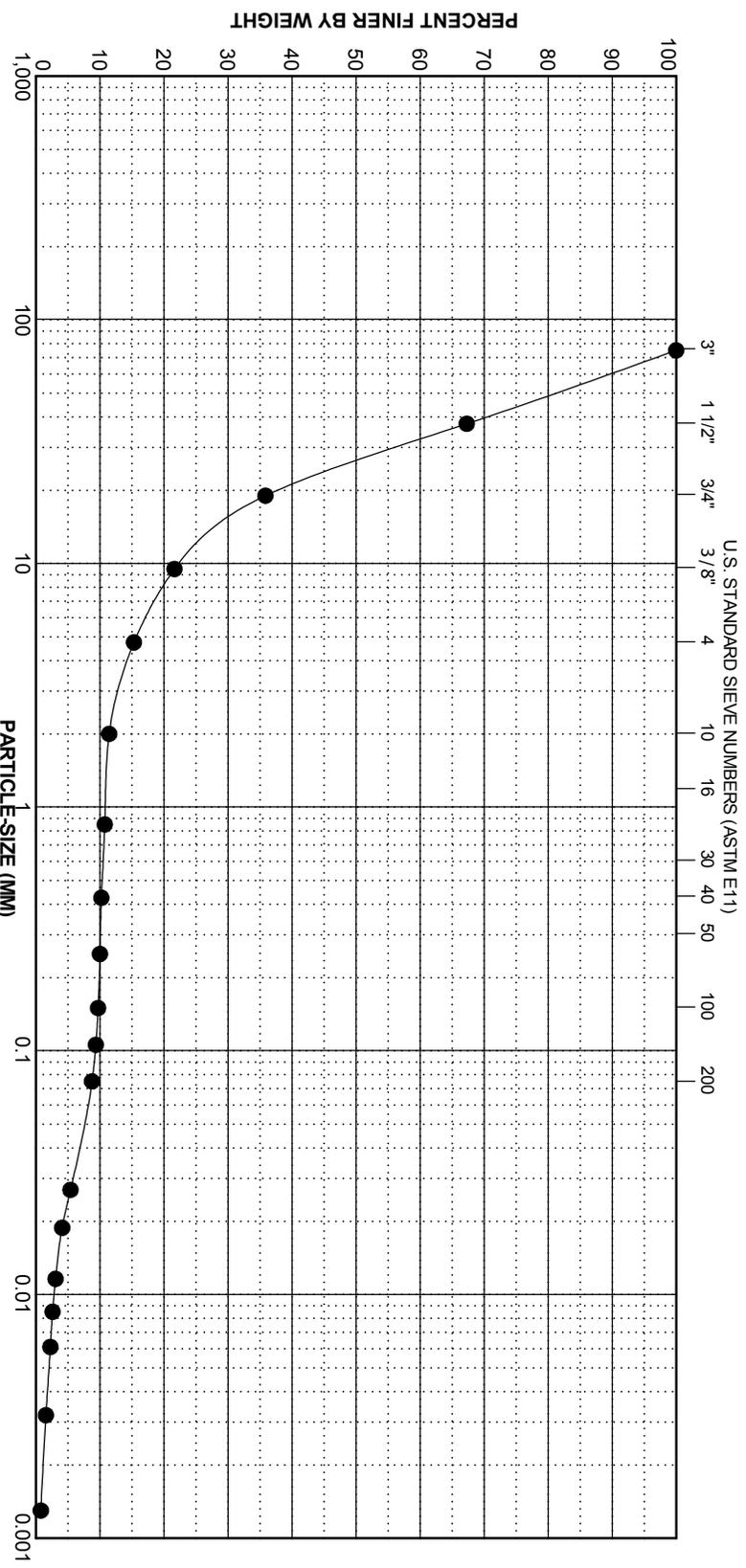
CHPRC - GEOTECHNICAL LABORATORY

PBS PROJECT NUMBER:  
63797

**PARTICLE-SIZE ANALYSIS TEST RESULTS**

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-174	B3BK04	51.5	26	32.0	25.8	14.3	0.2	0.02	85	7	9

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

WWW.RJLEEGROUP.COM

**REPORT OF LABORATORY TESTING**

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

**Date:** 10/2/2017  
**Sample Delivery Group No.:** W707078  
**Sample Authorization No.:** F16-040

**Project:** CHPRC Laboratory

**Project No.:** 63797.000

**Report of:** Permeability of Granular Soils - Constant Head (ASTM D2434)

**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:

Permeability of Granular Soils - Constant Head (ASTM D2434).

The permeability 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. The manometer system was attached and a stable head condition was attained. The quantity of flow, water temperature, water head and time were measured. This was repeated, if necessary, to establish an accurate region of laminar flow with velocity.

**LABORATORY TEST RESULTS**

**Permeability of Granular Soils - Constant Head (ASTM D2434)**

Customer Sample Number	Laboratory Sample Number	Date of Analysis	Quantity of flow discharged (cm <sup>3</sup> )	Dist. between manometers, L (cm)	Specimen area, A (cm <sup>2</sup> )	Total discharge time, t (sec)	Head diff. betw. manometers, h (cm)	Avg. Hydraulic Conductivity, k (cm/s)
B3BK04	H-0174	10/2/2017	5	7.62	45.84	420	54.3	7.19E-05

<b>SAMPLE ISSUE RESOLUTION (SIR) REPORT</b>	<b>SIR Number:</b> SIR18-0357 <b>Rev. Number:</b> 0 <b>Date Initiated:</b> 01/10/2018
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<b><u>SAMPLE EVENT INFORMATION</u></b>	
<b>SAF NUM(S):</b>	F16-040
<b>LABORATORY:</b>	RJL-GT

<b><u>SAMPLING INFORMATION</u></b>	
<b>NUMBER OF SAMPLES:</b>	1
<b>SAMPLE NUMBERS:</b>	B3BX53
<b>SAMPLE MATRIX:</b>	SOIL
<b>SDG NUM(S):</b>	W707078

<b><u>ISSUE BACKGROUND</u></b>	
<b>CLASS:</b>	Sample Management Issues
<b>TYPE:</b>	Cancellation of Analyses
<b>DESCRIPTION:</b>	Sample B3BX53 should be canceled.

<b><u>RESOLUTION</u></b>	
<b>PROPOSED RESOLUTION:</b>	D5084_HYDRAULIC CONDUDTIVITY should be canceled from B3BX53.

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

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F16-040-179	PAGE 1 OF 1
COLLECTOR Jalbon Churn 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-003	PROJECT DESIGNATION 100-HR-3 Long Term & Interim Action Monitoring - Soil	FIELD LOGBOOK NO. HMF-11-045-6	ACTUAL SAMPLE DEPTH 50.15 - 54.95 ft.	SAF NO. F16-040	AIR QUALITY <input type="checkbox"/>
ICE CHEST NO. N/A	OFFSITE PROPERTY NO. N/A		COA 300115	METHOD OF SHIPMENT GOVERNMENT VEHICLE	<b>ORIGINAL</b>
SHIPPED TO RJ LEE - GEOTECHNICAL			BILL OF LADING/AIR BILL NO. N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	None
A-Air	*Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/JATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	HOLDING TIME	6 Months
DL-Drum		TYPE OF CONTAINER	Split Spoon Liner
DS-Drum		NO. OF CONTAINER(S)	1
Solids		VOLUME	1000g
L=Liquid		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
O=Oil			
S=Soil			
SF=Sediment			
T=Tissue			
V=Vegetation			
W=Water			
WI=Wipe			
X=Other			
SPECIAL HANDLING AND/OR STORAGE NA			
SAMPLE NO. B3BK04	MATRIX*	SAMPLE DATE 7-18-17	SAMPLE TIME 1337

W707078  
15.3.C  
W707078



CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM Jalbon Churn CHPRC	DATE/TIME JUL 18 2017 1500	RECEIVED BY/STORED IN SSU-1	DATE/TIME JUL 13 2017 1500	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 perform (1) D2434_PERMEABILITY: COMMON; D422_PARTICLE SIZE (Dry Sieve): COMMON;	
RELINQUISHED BY/REMOVED FROM SSU-1	DATE/TIME JUL 20 2017 1500	RECEIVED BY/STORED IN SSU-1	DATE/TIME JUL 20 2017 1500		
RELINQUISHED BY/REMOVED FROM Leshy Mail CHPRC	DATE/TIME JUL 20 2017 1500	RECEIVED BY/STORED IN CHPRC	DATE/TIME JUL 20 2017 1500		
RELINQUISHED BY/REMOVED FROM Annaliese A. Stobbe	DATE/TIME 09/01/17 09:10	RECEIVED BY/STORED IN RBS - Park Brice P55	DATE/TIME 09/01/17 09:10		
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	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 7/12/2017 FSR ID = FSR47658 TRVL NUM = TRVL-17-165 A-6003-618 (REV 2)

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F16-040-225	PAGE 1 OF 1
COLLECTOR <i>Michael Churns</i> CARRPC	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-003	PROJECT DESIGNATION 100-HR-3 Long Term & Interim Action Monitoring - Soil	FIELD LOGBOOK NO. <i>Hill N-645-6</i>	ACTUAL SAMPLE DEPTH <i>50.15 - 54.95 Ft.</i>	SAF NO. F16-040	<input type="checkbox"/>
ICE CHEST NO. N/A	OFFSITE PROPERTY NO. N/A	BILL OF LADING/AIR BILL NO. N/A	COA 300115	METHOD OF SHIPMENT GOVERNMENT VEHICLE	<b>ORIGINAL</b>
SHIPPED TO RJ LEE - GEOTECHNICAL					

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS *Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.	PRESERVATION None	HOLDING TIME None	NO. OF CONTAINER(S) 1	VOLUME 1000g	SPECIAL HANDLING AND/OR STORAGE NA
A=Air DL=Drum L=Liquid DS=Drum S=Soil SE=Settlement T=Tissue V=Vegetation W=Water WI=Wipe X=Other						
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B3B53	SOIL	7-18-17	1337			

*U5707678*

*15.3°C*

*CO2*

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM <i>Michael Churns</i> CARRPC JUL 13 2017 1500	RECEIVED BY/STORED IN <i>SSU-1</i> JUL 13 2017 1500	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 perform  <i>Considered direct perform kit</i>  <i>10/05/17</i>
RELINQUISHED BY/REMOVED FROM <i>Leedy Ward</i> CARRPC JUL 20 2017 0700	RECEIVED BY/STORED IN <i>Leedy Ward</i> CARRPC JUL 20 2017 0700	
RELINQUISHED BY/REMOVED FROM <i>Leedy Ward</i> CARRPC JUL 20 2017 1130	RECEIVED BY/STORED IN <i>Leedy Ward</i> CARRPC JUL 20 2017 1130	
RELINQUISHED BY/REMOVED FROM <i>Anna White</i> CARRPC 09/01/17 09:10	RECEIVED BY/STORED IN <i>Anna White</i> CARRPC 09/01/17 09:10	
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
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DATE/TIME