



July 12, 2016

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 # W605123, 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 #) W605123.

**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 # W605123, has been assigned a PBS Geotechnical Lab Sample number per the below table.

CHPRC Sample #	SDG #	Geotechnical Lab Sample #
B35VB9	W605123	H-0067

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.

Rich Westberg  
 Laboratory Director, Columbia Basin Analytical Laboratories

07/12/2016

Date

If you have any questions, please feel free to contact us at 509-545-4989 or email at [rwestberg@rjleegroup.com](mailto:rwestberg@rjleegroup.com).

## Attachment 1

PBS Geotechnical Laboratory Testing Results, SDG # W605123,  
dated July 12, 2016



Engineering +  
Environmental

July 7, 2016

RJ Lee Group, Inc.  
Attn: Mr. Larry Lockrem  
Columbia Basin Analytical Laboratories  
2710 North 20th Avenue  
Pasco, Washington 93301

Re: Geotechnical Laboratory Testing Results  
Sample Delivery Group No. W605123  
PBS Project No. 63737.000

Dear Mr. Lockrem:

In accordance with your request, PBS Engineering and Environmental Inc. (PBS) is providing you with the results of our recent geotechnical laboratory testing. Our services were provided in accordance with the request provided with Sample Delivery Group (SDG) number W605123.

We performed the following tests:

- Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216)
- Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937)
- Grain Size Analysis - Hydrometer (ASTM D422)

The tests were performed in general accordance with the above-mentioned ASTM Standards.

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,  
PBS Engineering and Environmental, Inc.



7/7/2016

A handwritten signature in black ink, appearing to read 'Adam M. Swenson'.

Adam M. Swenson, P.E.  
Project Geotechnical Engineer

AS/rg

Attachments: Report of Laboratory Testing – Density by Drive Cylinder and Moisture Contents  
Report of Laboratory Testing – Grain-size Analysis - Hydrometer  
Chain of Custody

400 Bradley Boulevard, Suite 300, Richland, WA 99352  
509.942.1600 Main  
866.727.0140 Fax  
www.pbsenv.com


**REPORT OF LABORATORY TESTING**

<b>Report to:</b> CH2M-Hill - Plateau Remediation 2420 Stevens Center Place P.O. Box 1600 Richland, WA 99352	<b>Date:</b> 7/7/2016
	<b>Sample Delivery Group No.:</b> W605123
	<b>Sample Authorization No.:</b> F16-043
<b>Project:</b> CHPRC Laboratory	<b>Project No.:</b> 63797.000
<b>Report of:</b> Density by Drive Cylinder (ASTM D2937) Moisture Content (ASTM D2216)	<b>Lab Technician:</b> A. Jaimes

**Items Received:**

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

Density by Drive Cylinder (ASTM D2937).

The dry densities (dry unit weight) of representative soils were determined in the laboratory using the relatively undisturbed soil samples. The dimensions of the specimen were carefully measured, the volume calculated, and the specimen weighed. A representative sample was obtained from the specimen, weighed, and placed in the oven to dry. After oven drying, the representative sample was reweighed and the water content calculated. The dry density was then computed. The results of tests are included in the table below.

Moisture Content (ASTM D2216).

Natural moisture content determinations were made on the samples of the fine-grained soils (that is, silts, clays, and silty sands). The natural moisture content is defined as the ratio of the weight of water to dry weight of soil, expressed as a percentage.

**LABORATORY TEST RESULTS**
**Density by Drive Cylinder (ASTM D2937)**
**Moisture Content (ASTM D2216)**

Customer Sample Number	Laboratory Sample Number	Wet Density (lbs/ft <sup>3</sup> )	Water Content (%)	Dry Density (lbs/ft <sup>3</sup> )
B35VB9	H-0067	134.1	1.9	131.6

SHEET 1 OF 1

REVIEWED BY: A. Swenson, P.E.



**REPORT OF LABORATORY TESTING**

<b>Report to:</b> CH2M-Hill - Plateau Remediation 2420 Stevens Center Place P.O. Box 1600 Richland, WA 99352	<b>Date:</b> 7/7/2016 <b>Sample Delivery Group No.:</b> W605123 <b>Sample Authorization No.:</b> F16-043
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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> A. Jaimes

**Items Received:**

One sample was provided to us containing soil material obtained by you, the client. We 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. 40 sieve. The results of the mechanical grain size analyses and hydrometer testing are plotted on the attached Figures (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	Date of Analysis	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. 200
B35VB9	H-0067	6/16/2015	100.0	78.2	56.6	40.9	34.0	29.9	15.2	15.2	15.2	3.9	2.5





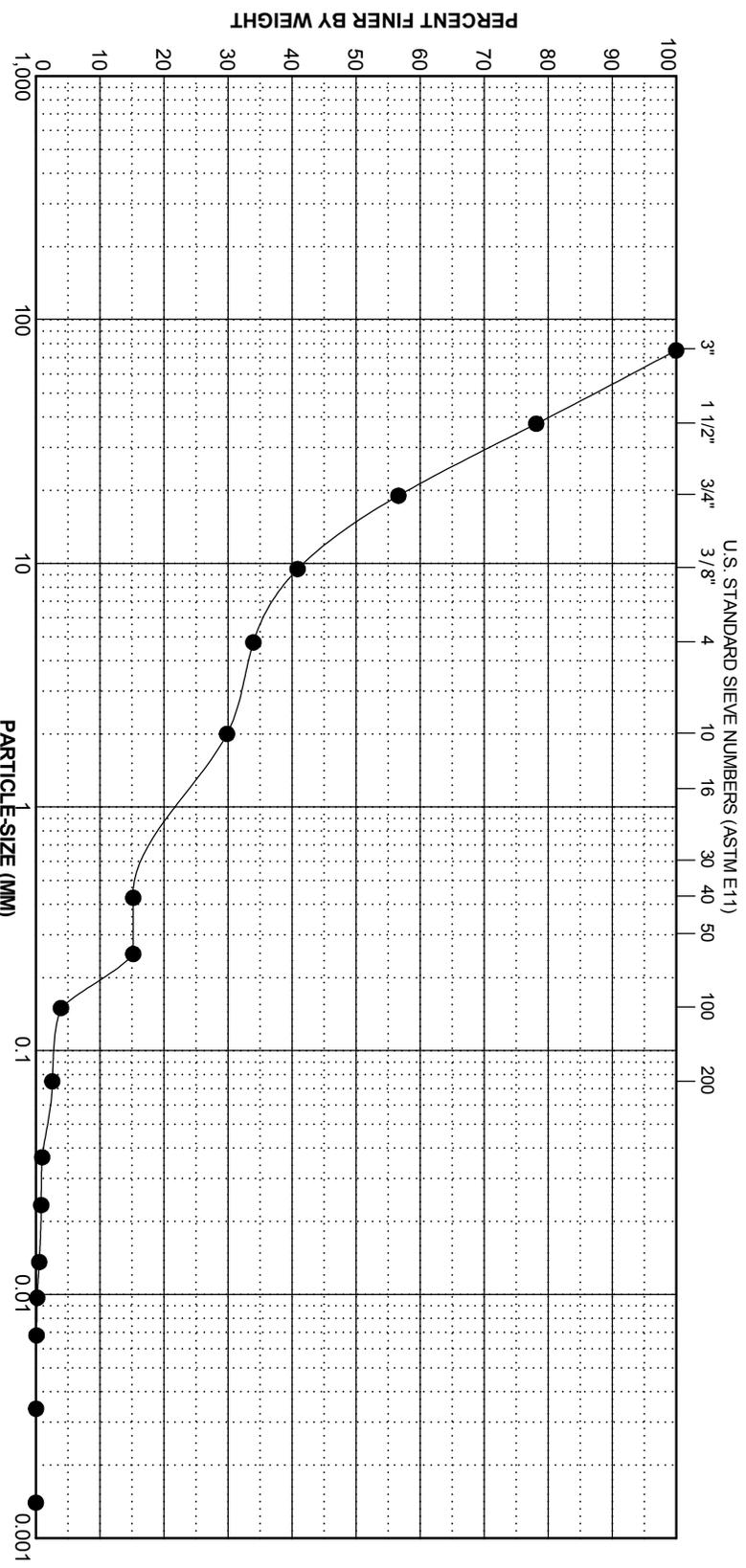
### PARTICLE-SIZE ANALYSIS TEST RESULTS

CHPRC - GEOTECHNICAL LABORATORY

PBS PROJECT NUMBER:  
63797

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-067	B35VB9	45.5	2	21.1	14.2	2.1	0.2	0.2	66	31	3

<b>COLLECTOR</b> Frank Hall CHPRC	<b>COMPANY CONTACT</b> TODAK, D	<b>TELEPHONE NO.</b> 376-6427	<b>PROJECT COORDINATOR</b> TODAK, D	<b>PRICE CODE</b> 8H	<b>DATA TURNAROUND</b> 30 Days / 30 Days
<b>SAMPLING LOCATION</b> C9400, I-002	<b>PROJECT DESIGNATION</b> 100-NR-2 Drilling - Soil	<b>FIELD LOGBOOK NO.</b> 14NF-N-645-3	<b>SAF NO.</b> F16-043	<b>AIR QUALITY</b> <input type="checkbox"/>	<b>METHOD OF SHIPMENT</b> GOVERNMENT VEHICLE
<b>ICE CHEST NO.</b>	<b>OFFSITE PROPERTY NO.</b>	<b>ACTUAL SAMPLE DEPTH</b> 45.5 to 46.0 ft	<b>COA</b> 304070	<b>ORIGINAL</b>	

**SHIPPED TO**  
RJ LEE - GEOTECHNICAL

**BILL OF LADING/AIR BILL NO.**

<b>MATRIX*</b> 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	<b>POSSIBLE SAMPLE HAZARDS/ REMARKS</b> *Contains Radioactive Material at concentrations that are not be regulated for transportation per 49 CFR/JATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1, NA	<b>PRESERVATION</b> None	<b>HOLDING TIME</b> None	<b>TYPE OF CONTAINER</b> G/P	<b>NO. OF CONTAINER(S)</b> 1	<b>VOLUME</b> 1000g	<b>SAMPLE ANALYSIS</b> SEE ITEM (1) IN SPECIAL INSTRUCTIONS
<b>SPECIAL HANDLING AND/OR STORAGE</b>							

<b>SAMPLE NO.</b> B35VB9	<b>MATRIX*</b> SOIL	<b>SAMPLE DATE</b> MAY 24 2016	<b>SAMPLE TIME</b> 1430	<b>DATE/TIME</b> MAY 24 2016 0700	<b>SPECIAL INSTRUCTIONS</b> SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS
<del>B35V09</del>	<del>SOIL</del>	<del>MAY 24 2016</del>	<del>1430</del>	<del>MAY 24 2016 0700</del>	<del>SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS</del>

<b>CHAIN OF POSSESSION</b>		<b>SIGN/ PRINT NAMES</b>		<b>SPECIAL INSTRUCTIONS</b>	
<b>RELINQUISHED BY/REMOVED FROM</b> Frank Hall CHPRC	<b>DATE/TIME</b> MAY 24 2016 0700	<b>RECEIVED BY/STORED IN</b> SSU #1	<b>DATE/TIME</b> MAY 24 2016 0700	SEE PAGE 2 FOR ALL SPECIAL INSTRUCTIONS	
<b>RELINQUISHED BY/REMOVED FROM</b> SSU #1	<b>DATE/TIME</b> MAY 26 2016 0700	<b>RECEIVED BY/STORED IN</b> C.M. Aguilar/CHPRC	<b>DATE/TIME</b> MAY 26 2016 0700	Linamar	
<b>RELINQUISHED BY/REMOVED FROM</b> C.M. Aguilar/CHPRC	<b>DATE/TIME</b> MAY 26 2016 11:20	<b>RECEIVED BY/STORED IN</b> only from Alex Soler	<b>DATE/TIME</b> MAY 26 2016 11:20		
<b>RELINQUISHED BY/REMOVED FROM</b>	<b>DATE/TIME</b>	<b>RECEIVED BY/STORED IN</b>	<b>DATE/TIME</b>		
<b>RELINQUISHED BY/REMOVED FROM</b>	<b>DATE/TIME</b>	<b>RECEIVED BY/STORED IN</b>	<b>DATE/TIME</b>		
<b>RELINQUISHED BY/REMOVED FROM</b>	<b>DATE/TIME</b>	<b>RECEIVED BY/STORED IN</b>	<b>DATE/TIME</b>		
<b>LABORATORY SECTION</b>	<b>RECEIVED BY</b>	<b>TITLE</b>	<b>DATE/TIME</b>		
<b>FINAL SAMPLE DISPOSITION</b>	<b>DISPOSAL METHOD</b>	<b>DISPOSED BY</b>	<b>DATE/TIME</b>		

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F16-043-006	PRICE CODE	8H	DATA TURNAROUND
COLLECTOR	Frank Hall CHPRC	COMPANY CONTACT	TODAK, D	TODAK, D			30 Days / 30 Days
SAMPLING LOCATION	C9400, 1-002	PROJECT DESIGNATION	100-NR-2 Drilling - Soil	SAF NO.	F16-043	<input type="checkbox"/>	
ICE CHEST NO.		FIELD LOGBOOK NO.	HNF-N-645-3/	COA	304070		<b>ORIGINAL</b>
SHIPPED TO	RJ LEE - GEOTECHNICAL	OFFSITE PROPERTY NO.	45.5 to 46.0 ft	METHOD OF SHIPMENT GOVERNMENT VEHICLE			
BILL OF LADING/AIR BILL NO.							

**SPECIAL INSTRUCTIONS**

SAMPLE B35VB9 PORTION D; SAMPLE B35VC0 PORTION C; SPLIT SPOON PARTS B & A WILL BE COMBINED TO ENSURE ADEQUATE SAMPLE MATERIAL FOR ANALYSIS; SAMPLE A AND B PORTION SAMPLES B35VC1, B35VC2, B35VC3, B35VC4 \*\* 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.  
 (1) D2937\_ DENSITY: COMMON {Bulk density - dry, Bulk density - wet}; D422 PARTICLE SIZE (Dry Sieve): COMMON {Percent passing 1.5 inch sieve, Percent passing 3 inch sieve, Percent passing 3/4 inch sieve, Percent passing 3/8 inch sieve, Percent passing No.10 sieve, Percent passing No.100 sieve, Percent passing No.140 sieve, Percent passing No.20 sieve, Percent passing No.200 sieve, Percent passing No.4 sieve, Percent passing No.40 sieve};

7/14/2016