DOCUMENT RELEASE FORM

(1) Document Number:	RPP-RPT-56849	(2) Revision Number: 0	(3) Effective Date: 06/26/2014
(4) Document Type:	☐ Digital Image ☐ Hard copy ☒ PDF ☐ Video	(a) Number of pages (including the DRF) or number of digital images	~~430~~ 428 JRR 7/2/14
(5) Release Type	☒ New ☐ Cancel	☐ Page Change	☐ Complete Revision
(6) Document Title:	Completion Report for Direct Push Activities to Support SX Pore Water Extraction Test, Phases I-III	(7) USQ No.: R- ☒ N/A RPP-27195 USQ Evaluator Sign/Date	
(8) Change/Release Description:	Initial release		
(9) Change Justification:	N/A		

(10) Associated Structure, System, and Component (SSC) and Building Number:	(a) Structure Location:	(c) Building Number:	(e) Project Number:
	N/A	N/A	T2C17
	(b) System Designator:	(d) Equipment ID Number (EIN):	
	N/A	N/A	

(11) Impacted Documents:	(a) Document Type	(b) Document Number	(c) Document Revision
	N/A	N/A	N/A

(12) Approvals:

(a) Author (Print/Sign): H. A. Sydnor — Date: 4-2-14

(b) Reviewer (Optional, Print/Sign):

D. L. Parker — Date: 5/5/14

R. S. Wiegman — Date: 3/27/14

Date:

Date:

Date:

Date:

(c) Responsible Manager – (Print/Sign): S. J. Eberlein — Date: 06/26/14

(13) Distribution:

(a) Name	(b) MSIN	(a) Name	(b) MSIN
H. A. Sydnor	H6-17		
S. J. Eberlein	H6-13		
D. L. Parker	H6-13		
C. L. Tabor	H6-13		
A. Shrum	H6-13		
P. C. Berlin	G1-62		
R. S. Wiegman	H6-14		

Release Stamp

DATE: Jul 02, 2014 HANFORD RELEASE

(14) Clearance	(a) Cleared for Public Release	(b) Restricted Information?	(c) Restriction Type:
	☒ Yes ☐ No	☐ Yes ☒ No	

(15) Clearance Review (Print/Sign): APPROVED By Julia Raymer at 11:21 am, Jul 02, 2014 Date:

A-6003-881 (REV 8)

Completion Report for Direct Push Activities to Support SX Pore Water Extraction Test, Phases I-III

Author Name:
P. C. Berlin – EnergySolutions Federal Services Hanford
H. A. Sydnor – Washington River Protection Solutions, LLC
Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-08RV14800

EDT/ECN:	DRF	UC:	
Cost Center:		Charge Code:	
B&R Code:		Total Pages:	~~430~~ 428 JRR 7/2/14

Key Words: Direct Push, Pore Water Extraction, Hydraulic Hammer Unit, SX Tank Farm, Vadose Zone, Extraction and Monitoring wells, Geophysical logging and Small diameter Bore Hole

Abstract: This report details field activities for using small diameter soil borings for extracting pore water from partially saturated sediments. Stage I included field activates to obtain additional information at prospective sites. Stage II includes collecting soil samples for identifying preferred test location and designing test equipment associated with monitoring systems. Stage III includes procurement and installation of monitoring system in four new soil borings.

RPP-RPT-56849
Revision 0

Completion Report for Direct Push Activities to Support SX Pore Water Extraction Test, Phases I-III

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
Office of River Protection under Contract DE-AC27-08RV14800

P.O. Box 850
Richland, Washington 99352

CONTENTS

APPENDICES

TABLES

FIGURES

TERMS

BGO	bismuth germinate oxide
bgs	below ground surface
DOW	Description of Work
Ecology	State of Washington, Department of Ecology
Energy*Solutions*	Energy*Solutions* Government Group, Inc.
GSI	GSI Water Solutions, Incorporated
ICP	Inductively Coupled Plasma
ID	inside diameter
JHA	Job Hazard Analysis
LaBr	lanthanum bromide
OD	outside diameter
PNNL	Pacific Northwest National Laboratory
PVC	polyvinyl chloride
RPP	River Protection Project
WAC	*Washington Administrative Code*
WRPS	Washington River Protection Solutions, LLC

RPP-RPT-56849, Rev. 0

COMPLETION REPORT FOR 241-SX TANK FARM DIRECT PUSH PORE WATER EXTRACTION

1.0 INTRODUCTION

The U.S. Department of Energy assigned the River Protection Project (RPP) Washington River Protection Solutions, LLC (WRPS) Richland, Washington, to plan and conduct subsurface pore water extraction testing near the SX Tank Farm located in the 200 West Area of the Hanford Site. WRPS contracted Energy*Solutions* Government Group, Inc. (Energy*Solutions*) to perform the field activities required to gather information to support the testing actions and to provide design and operational support for conducting extraction testing. The results from the extraction testing are intended to refine the extraction system designs and provide guidance for the potential future use of these types of small diameter extraction systems for removal of contaminate load in subsurface sediments.

In accordance with RPP-PLAN-53808, *200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan*, this project was performed in three stages. Stage I included field activities to obtain additional information about three prospective test locations for the project. This involved pushing and logging three test locations to determine if the locations had sedimentary deposits of the correct nature with adequate moisture content for application of soil moisture extraction techniques. The second stage involved pushing boreholes adjacent to the logging boreholes, collecting samples, identifying a preferred test location, and designing the test equipment and associated monitoring system. The third stage of field work involved procurement and installation of the monitoring equipment, including the pushing of four boreholes at the selected test location.

Initial documentation for this project did not follow the terminology for the stages as identified above and in RPP-PLAN-53808. Field work for the first two stages was addressed in GG-NW-DOW-001, *Description of Work: SX Pore Water Extraction – Stage I*, Rev. 0 (see Appendix A). (Note: Although GG-NW-DOW-001 only calls out Stage I, it covers all field work for the activities that are referred to as Stages I and II in RPP-PLAN-53808. Field work for Stage III was addressed in PL-36472-OP-0002, *Description of Work – SX Pore Water Extraction – Stage III*, Rev. 0 (see Appendix B).

Energy*Solutions* was responsible for providing equipment and personnel to conduct the direct push activities, geophysical logging services, soil sample collection, and safety oversight. Energy*Solutions* also provided technical support, designed and performed a “falling head” test sequence, and prepared final reports. The following appendices contain copies of documentation generated during the performance of the above work scope. Where appropriate, the appendices are grouped into those covering Stages I and II and then those covering Stage III.

Appendix A, GG-NW-DOW-001, *Description of Work: SX Pore Water Extraction – Stage I*, Rev. 0 (Stages I and II)
Appendix B, PL-36472-OP-0002, *Description of Work- SX Pore Water Extraction –Stage III, Rev. 0*
Appendix C, Drilling and Sampling Daily Work Records (Stages I and II)
Appendix D, *Geophysical Logging in the 241-SX Tank Farm*, Report from Three Rivers Scientific (Stages I and II)
Appendix E, Sample Determination Meeting Minutes (Stages I and II)
Appendix F, Sample Authorization and Chain of Custody Forms (Stages I and II)
Appendix G, *Vadose Zone Falling Head Test Evaluation*, Report from GSI (Stages I and II)

Appendix H, Drilling and Sampling Daily Work Records (Stage III)
Appendix I, *Geophysical Logging in the 241-SX Tank Farm, July 2013*, Report from Three Rivers Scientific (Stage III)
Appendix J, *Vadose Zone Well Development Falling Head Test Data Evaluation for Boreholes C8826, C8825, C8824, and C8823*, Report from GSI (Stage III)

Appendix K, State of Washington Department of Ecology Documents (All Stages)
Appendix L, Global Positioning System Coordinates and Map (All Stages)
Appendix M, Safety Documentation (All Stages)

2.0 STAGES I AND II

2.1 SUMMARY OF ACTIVITIES

As stated above, the field work for this project was divided into three stages. Guidance documentation and preparation for field activities for the first two stages was addressed in GG-NW-DOW-001, *Description of Work: SX Pore Waster Extraction – Stage I*, Rev. 0 (Appendix A), and Job Hazard Analysis (JHA) GG-NWOP-RO-1858, *Hanford SX Tank Farm Pore Water Extraction Stage I*, which were released on January 2, 2013.

Mobilization to SX Farm began on January 8, 2013, with the transportation and staging of a direct push rig and equipment south of the SX Farm fence line. Field-related activities for Stages I and II were completed and all equipment was surveyed and released, or packaged for disposal, on March 27, 2013. There were 48 working field days during this period. There was an initial delay in job start for work package modification and release that delayed actual set up of the direct push equipment and commencement of probe placement until January 21 (nine working days elapsed time). Total delays due to lack of onsite support, industrial hygiene concerns, weather issues, and work package changes totaled approximately 20 working days (180 hours). See Appendix C for copies of the Drilling and Sampling Daily Work Records.

The early work delays are attributable in part to the long hiatus between field deployments (i.e., no field activities for Vadose Group from December 2011 until January 2013). Many of the

support personnel utilized for generation of the required job start documentation and field support had not previously been involved in direct push work. An additional delay of field activities occurred when the WRPS Environmental personnel requested vapor samples from the target extraction zones. The release of the work package for starting the job was delayed while the Industrial Hygiene Sampling Plan was prepared for inclusion into the package. During work activities, an additional delay of two days was encountered during the implementation of the field vapor sampling actions.

Figure 1 shows the three planned locations for investigation in Stages I and II. The initial scope included an exploration hole for use in gathering logging information and a sampling hole for collection of two to three soil samples at each planned location. In addition to the logging and sampling, “falling head” tests were planned to provide information related to the degree of wall compaction produced by the displacement of soils as the direct push is advanced. The falling head testing was proposed to provide information demonstrating the ability of the borehole wall to allow water influx and the changes in this rate of influx after surging /bailing and repetition of the falling head testing sequence. Section 2.5 describes the falling head tests in more detail

Of the three planned locations, the initial site (C8757) met refusal at 11.5 ft below ground surface (bgs) on three tries. This was interpreted to indicate that there was a significant area of subsurface debris at this location and further efforts in this area were abandoned. At the remaining two locations (C8759 and C8761), the exploration holes were driven to approximately 150 ft bgs and spectral gamma (with a combination lanthanum bromide /bismuth germinate oxide (LaBr/BGO) instrument) and neutron-neutron moisture log data were collected. Three sets of samples were collected in each of the two sampling boreholes, placed adjacent to the exploration boreholes, for a total of six discrete samples.

2.2 DIRECT PUSHING

Exploration hole placement and sampling was accomplished with the use of a hydraulic hammer system. Exploration boreholes were pushed using a 6.35 cm (2.5 in.) outside diameter (OD) x 4.45 cm (1.75 in.) inside diameter (ID) casing at predetermined locations to specified depths, or refusal.

After logging the exploration boreholes, the data was reviewed by WRPS personnel and sample locations and depths were selected. Sampling boreholes were then pushed, within 0.6-1 m (2-3 ft) of the exploratory holes, for sample retrieval at the selected depths.

2.3 GEOPHYSICAL LOGGING

Energy*Solutions* and Three Rivers Scientific conducted the geophysical logging data collection and analysis services on the exploration 6.35 cm (2.5 in.) probe boreholes. For the geophysical logging, a portable small diameter logging system was used to collect spectral gamma and moisture data from the bottom of the borehole to the ground surface. Calibration details, survey

results, and data interpretation, as well as copies of the collected and processed log data, for Stages I and II are provided in Appendix D.

2.4 SOIL SAMPLING

2.4.1 Sample Selection

Selection of specific zones for sampling at the two locations under investigation was based on the need to identify target areas for pore water extraction. Criteria were selected based on modeling results from the Pacific Northwest National Laboratory (PNNL) and subsurface data collected nearby in SX Tank Farm. The extraction zone required:

- A moisture content greater than 25% by volume.
- A grain size range composed primarily of fine to very fine sand and silt. (Course grained material and heavy clay zones are not conducive to extraction).
- A minimum thickness of 2+ feet of "uniform" grain size material.
- Measurable Tc^{99} and/or nitrate values to assist in evaluation of the extraction productivity (if possible).

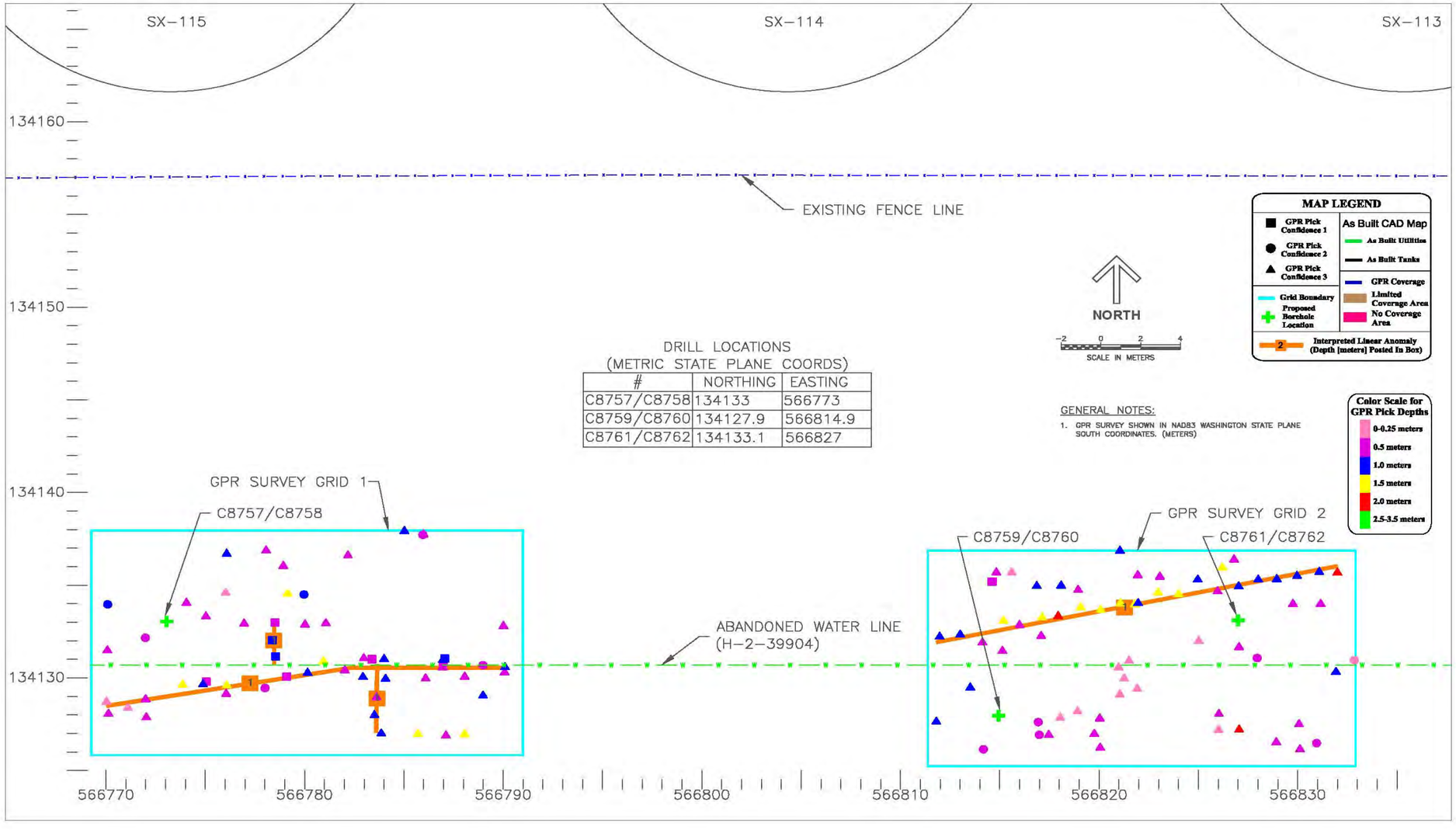
Based on review of the geophysical logs and comparison to nearby boreholes and direct push data from inside SX Tank Farm, two target zones (one in each exploration well) were selected for sampling. For well C8759 (sampling well C8760) the zone was 121 to 127 ft bgs and for C8761 (sampling well C8762) the target zone was 123 to 129 ft bgs. (See Appendix E for meeting minutes from sample selection meeting).

2.4.2 Sample Collection

Soil sampling with the rotary hammer unit was accomplished with a dual-wall sampling system. With the dual-wall system, once the sample depth has been reached, the inner rod with the dummy drive tip is removed, and the drive tip is replaced with a sampler. The sampler consists of a 6.67 cm (2.625 in.) OD × 4.76 cm (1.875 in.) ID outer sample barrel, which holds a 4.13 cm (1.625 in.) OD × 48.63 cm (18.75 in.) long inner sample barrel. The inner sample barrel houses three 3.18 cm (1.25 in.) OD × 15.24 cm (6 in.) long stainless steel sample liners. Once the sampler and inner rod have been lowered and seated into the outer drive rod, the two are simultaneously advanced far enough to ensure that the sampler is completely filled with material. Unless refusal is met, the sampler is typically driven 0.61 m (2 ft).

Prior to sampling, the sample liners, inner sample barrel, and sampling utensils were cleaned by 222-S Laboratory personnel using standard *Resource Conservation and Recovery Act of 1976* protocol cleaning methods in accordance with *ATL LO-080-156, Cleaning of Containers and Sample Collection Equipment*. Equipment used for push advance purposes (e.g., push rods, tips) was wiped down with a Simple Green® solution. This cleaning ensured that no cross contamination was introduced from the previous use of the equipment or from the manufacturing process.

Figure 1. Site Map for Stages I and II.



Samples were obtained and analyzed in accordance with WRPS Sample Authorization Forms, V13-001 and V13-002. Samples were analyzed for anions, pH, conductivity, radioisotopes, and several other analytes. Metals were analyzed using ICP mass spectrometry methods. Copies of the Sample Authorization and Chain of Custody forms are provided in Appendix F and sampling results are shown below.

2.4.3 Sampling Results

Table 1 shows the locations, intervals, sample numbers, and percent of sample recovered for samples taken during Stages I and II. Tables 2 and 3 show the sampling results for nitrate and Tc^{99}.

Table 1. Sample Intervals for Stages I and II.

Borehole Number	Depth (ft)	Sample Number	Percent Recovery
C8760	121-123	B2NPN4, B2NPN5, B2NPN6, B2NPN7	100%
	123-125	B2NPN9, B2NPP0, B2NPP1, B2NPP2	100%
	125-127	B2NPP4, B2NPP5, B2NPP6, B2NPP7	100%
C8762	123-125	B2NR97, B2NR98, B2NR99, B2NRB0	100%
	125-127	B2NRB1, B2NRB2, B2NRB3, B2NRB4	100%
	127-129	B2NRB5, B2NRB6, B2NRB7, B2NRB8	100%

Table 2. Sample Results for Nitrate and Technetium^{99} – C8760.

Customer ID #	Core (depth in ft)	Type	% H_2O	Nitrate (ug/g)	Tc-99 (pCi/g)
B2NPN8 (**S13V000012)**	C8760 I001 (121-123)	Sample	10.98	6.05	0.128 (U)
		Duplicate		6.25	0.126 (U)
B2NPP3 (**S13V000024)**	C8760 I002 (123-125)	Sample	12.29	7.92	0.131 (U)
B2NPP8 (**S13V000036)**	C8760 I003 (125-127)	Sample	11.29	8.79	0.128 (U)
		Prep Blank	NA	0.081 ug/mL	0.102 pCi/mL (U)

NA – not applicable
U – Result is less than the detection limit

Table 3. Sample Results for Nitrate and Technetium^{99}- C8762.

Customer ID #	Core (depth in ft)	Type	% H_2O	Nitrate (ug/g)	Tc-99 (pCi/g)
B2NRB9 (**S13V000047)**	C8762 I001 (123-125)	Sample	15.60	8.22	0.139 (U)
		Duplicate		8.19	0.139 (U)
B2NRC0 (**S13V000058)**	C8762 I002 (125-127)	Sample	7.22	5.01	0.119 (U)
B2NRC1 (**S13V000069)**	C8762 I003 (127-129)	Sample	13.90	14.6	0.134 (U)
		Prep Blank	NA	<0.0208 ug/mL	0.102 pCi/mL (U)

NA – not applicable
U – Result is less than the detection limit

Based on the sampling results and descriptions of the soils recovered from the sampling efforts, the geophysical logs were expanded in the zones of interest for use in delineating the targets for testing and potential pore water extraction for Stage III. Figures 2 and 3 show the expanded logs with soil information included. These figures were utilized for precisely identifying the target zones for conducting borehole wall compaction reduction testing through performances of falling head testing and surging.

2.5 SPECIALIZED TESTING FOR STAGES I AND II

2.5.1 Falling Head Testing

Material is compressed into the borehole wall as drill rods are pushed into the ground using the hydraulic push technique. This displaced material creates a compaction zone where approximately 0.75 cubic in. of material is compressed into each square inch of wall as the pipe is advanced. Falling head testing was performed as part of Stages I and II to evaluate the well development technique consisting of the introduction of water with subsequent surging and bailing to break down the compacted borehole wall. During project planning, it was speculated that this compaction skin (assumed to be essentially an impermeable barrier) would not allow, or would critically reduce the effectiveness of a vacuum for extracting water-bearing vapors from the formation. The falling head and surging activities were designed with two goals: 1) to provide the means to modify (i.e., break down) the compaction zone and 2) to collect data for comparison of the initial conditions and the conditions after application of the surging and bailing methodologies. Instructions for conducting the falling heads tests were prepared jointly by GSI Water Solutions Inc. (GSI) and Energy*Solutions* staff prior to field deployment.

Figure 2. Expanded Log Showing Zone of Interest in C8759.

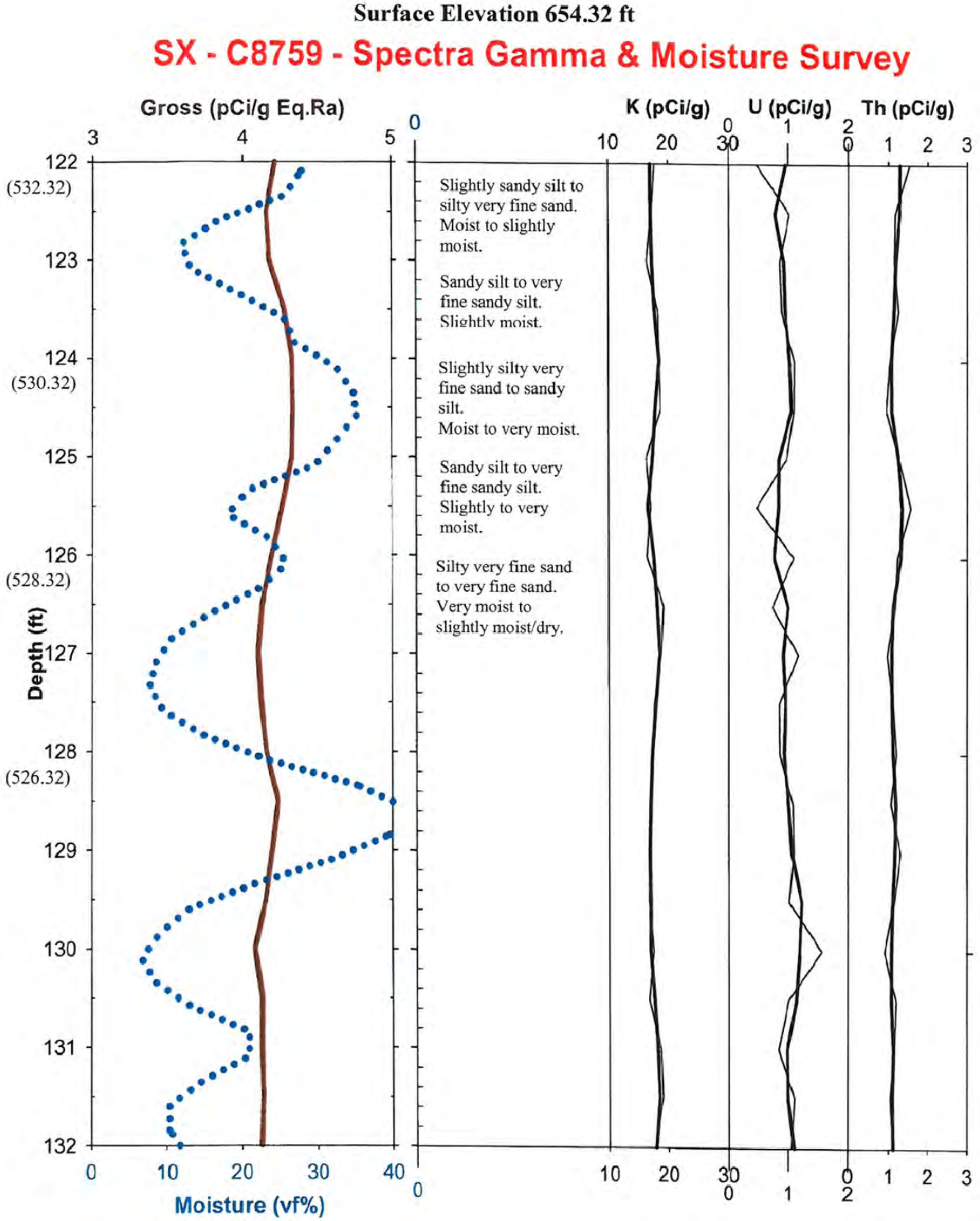
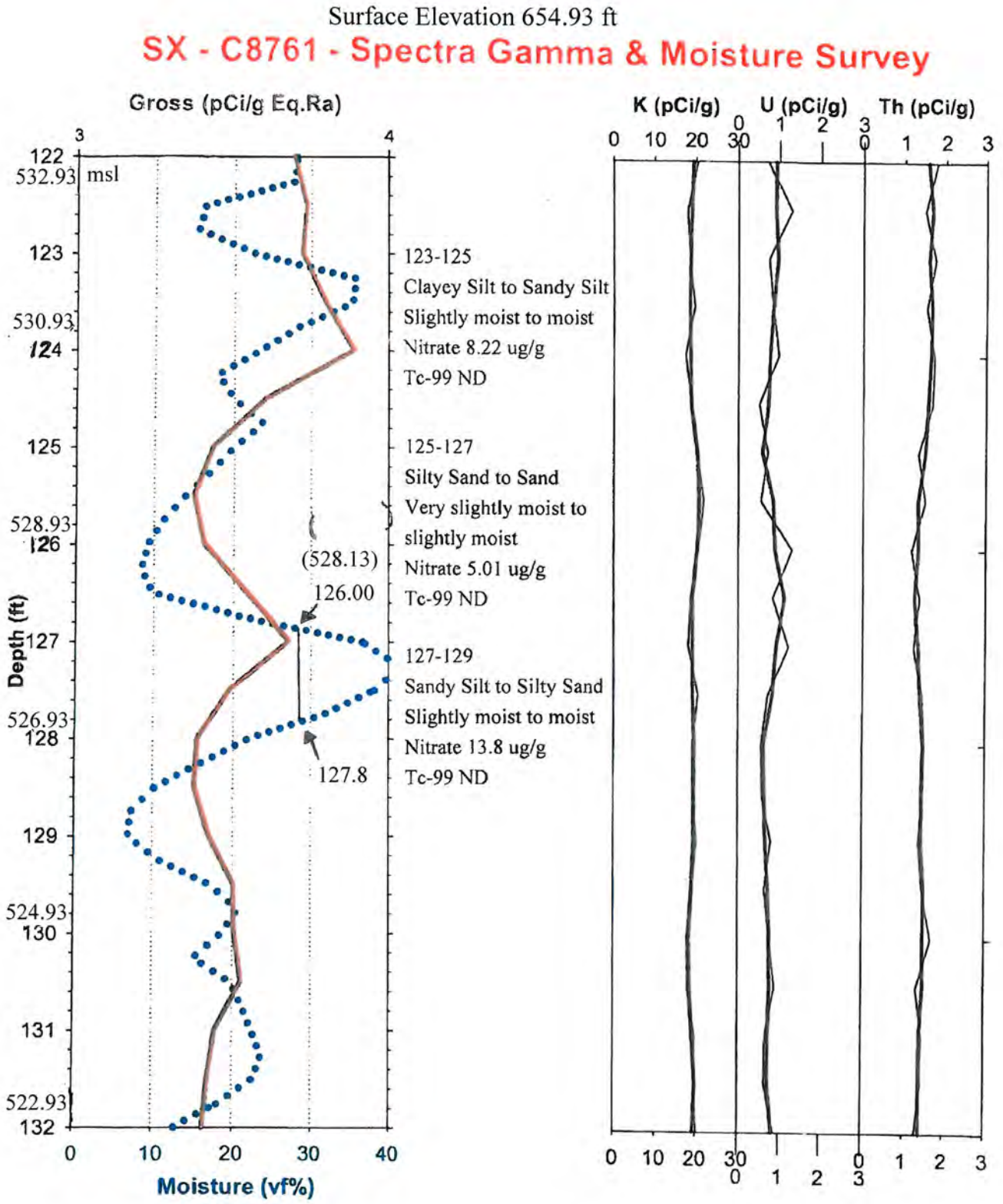


Figure 3. Expanded Log for Zone of Interest C8761.



The falling head tests were conducted by centering a 2 ft long, 20 slot screen section in the zone of investigation. The screen and a sump were connected to the surface by a polyvinyl chloride (PVC) riser pipe. An In-Situ Inc.® Level Troll 700 pressure logging transducer positioned in the sump was connected to a computer at the surface. A measured volume of water was introduced into the borehole and allowed to infiltrate into the borehole wall and formation. The rate of decline of the height of water in the riser pipe (i.e., the falling head) was plotted on the computer. An onsite hydrologist observed the data plots and provided direction regarding length of time for data collection, whether or not to repeat the test, and actions taken at the conclusion of the individual tests.

Graphs generated by plotting the head height vs. time were utilized to calculate the borehole wall effective permeability, (K). This data was used to determine the net effect of the direct push methodology on formation permeability thus deriving a determination of initial effective permeability.

By viewing onsite plots of the falling head elevations, the onsite hydrologist could observe when the time vs. head height had reached “steady state” (i.e., the rate of change in the plotted curve was less than one). The test would be terminated and the pressure transducer would be removed from the well. If necessary, additional water was added to the well in order to assure that the zone of investigation (screen interval) had a sufficient fluid height to cover the screen. The volume of water added to the well was recorded on the daily work records. A slug rod/surge-block was inserted into the screen for surging the well. The screen zone was surged by the up and down movement of the slug rod/surge-block for up to 15 minutes and a measurement to determine the water level in the well was performed. The remaining water was removed from the well (purged) and a second falling head test was performed by placing a transducer, adding a measured volume of water, and tracking time vs. head height with the onsite computer graphics. The onsite hydrologist compared the generated test graphics (test 1 vs. test 2) and determined if additional water and surging was warranted, or if additional falling head tests needed to be conducted. These iterative steps of falling head testing and surging were repeated until comparison of the generated test graphics indicated that surging and bailing demonstrated no effective gain in the borehole wall permeability.

2.6 DATA AND INTERPRETATIONS

Falling head testing was planned for both C8759 and C8761. C8759 was the first well in which the placement of the test well screen and riser was attempted. After placement, based on the measurement of the total length of the screen and riser assembly compared to the length of casing present in the well, it was determined that the end cap of the sump and screen did not pass through the end of the 2.5 in. OD (1.75 in. ID) casing, as intended.

The clearance between the casing and the riser and screen was restricted, (the OD of the riser and screen was 1.66 in. and the ID of the casing was 1.75 in.) leaving a clearance of less than 1/20 in. (0.05 in.) on a side. The entire 2.5 in. casing string was removed to determine why the riser and screen would not pass through the casing shoe to total depth. On inspection, it was noted that when the disposable tip (which is held in place during driving with rivets through the casing into

the tip) was driven off to remove the tip before back-pulling the casing from total depth, jagged edges of the broken rivets were left protruding through the casing wall into the interior of the casing. There are four rivets points holding on the disposable tip. In this case, the total combined length of the broken rivets protruding into the interior of the casing was greater than the clearance allowed between the riser and screen assembly and the inner casing wall. Because the temporary screen could not be placed, no permeability testing was conducted in C8759 and the borehole was decommissioned.

To solve this issue, a cleaning shear was fabricated and was utilized to clean the broken rivets from the interior of C8761. This allowed the riser and screen to pass through the rivet section freely and falling head tests were conducted in this borehole.

GSI analyzed the data generated during the falling head tests. The primary data was collected during a series of five falling head tests done between March 12, 2013 and March 20, 2013 using pressure logging transducer installed in borehole C8761. Appendix G contains the GSI report on the falling head tests. The specific field activities performed during each test, data analysis, and hydrographs are provided.

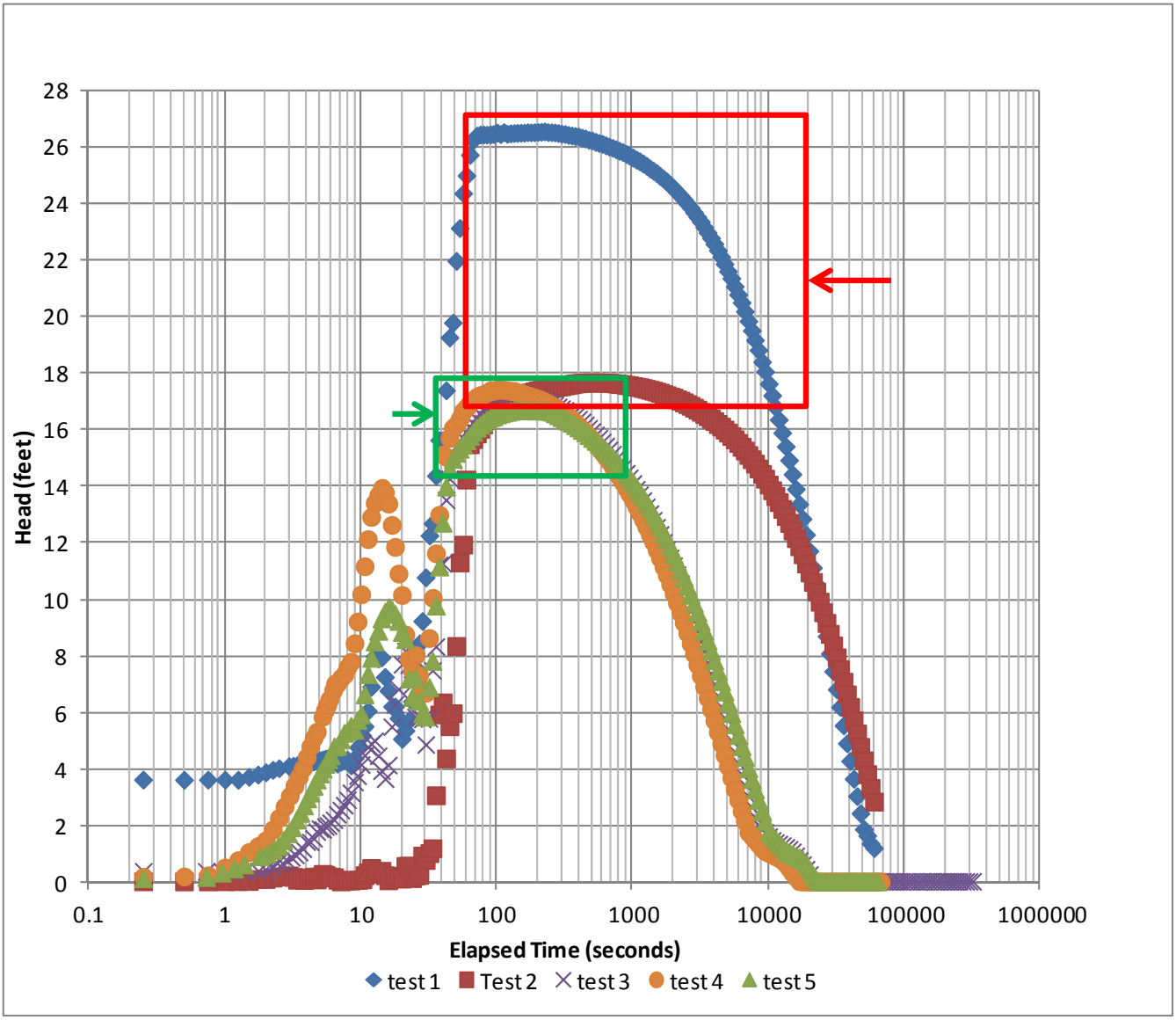
Visual examination of the hydrographs indicates that during the first 100 plus seconds of each test, the water levels rose. This is interpreted to reflect the pouring of the 2 gallon test volume into the boring. For that reason, the report focused on the data collected after 100 seconds as this data was interpreted to provide the most information regarding the progress of development and the breaking down of the compaction zone within the borehole wall.

Figure 4 depicts the progressive change in borehole permeability as falling head testing, surging/purging and retesting progressed. Generally, in tests 1 and 2, the water levels rose and/or were static between 100 and 500 to 600 seconds into the test. Conversely, in tests 3, 4, and 5, the water levels began to decline between 100 and 200 seconds into each test. Later in the tests, both test 1 and 2 show that the boring took in excess of 60,000 seconds to drain while in tests 3, 4, and 5 the boring was largely drained by 10,000 to 20,000 seconds into the test. As indicated in Figure 4, there were no significant improvements in head decline rate or duration after the second round of surging and cleanout (between test 2 and 3). This indicates development/enhancement of wall permeability had improved as far as was readily achievable.

Based on the visual examination of the data, surging and purging (well development) was interpreted to have broken down the compaction zone within the borehole. The data suggests that the development work conducted between tests 4 and 5 yielded little to no additional improvements in the breakdown of the compaction zone, and that the boring was as developed as this technique could accomplish.

Additional comments and interpretations specific to each falling head test are given in the GSI report in Appendix G.

Figure 4. Falling Head Test Results for C8761.



2.7 CONCLUSIONS AND RECOMMENDATIONS

The well development process of purging and surging worked well to break down the compaction zone generated by the hydraulic hammer push technique. Based on the data, once development succeeds in breaking down the compaction zone, falling head tests will show a change from the trend seen in tests 1 and 2, (where water level was relatively static before it began to fall – critical portion of the curve in the red box in Figure 4) to that seen in tests 3, 4, and 5 where water level began falling from essentially the beginning of the test (see critical area enclosed in the green box in Figure 4).

For future well development activities, the following recommendations are made:

1. Once the borehole is ready for development, add a 2 gallon slug of water to it.

2. Leave this slug of water in the borehole for at least 12 hours. The purpose of this is to have water permeate the compaction zone to begin softening and degrading it in preparation for the subsequent surge and purge development.

3. Begin development activities using three to four surge and purge events. Each surge and purge will generally include:
    a. Addition of 2 gallons of water to the boring.
    b. Surging the boring for 30 minutes.
    c. Purging that water from the boring.
    d. Repeating steps a through c until such time as the purge water is visibly less turbid as compared to the initial purge.

4. When the purge water is visibly less turbid, conduct a falling head test.
    a. Compare the graph from this test to the graph generated from the initial test to see if the slug of water stabilizes as it did in tests 1 and 2, or quickly begins to fall as it did in tests 3, 4, and 5.

5. If the slug shows the slow rise, stabilization, and slow fall seen in the first 30 minutes of tests 1 and 2, development of the compaction skin is interpreted to be incomplete, and steps 3 and 4, above, should be repeated.

6. If the slug shows the rapid fall seen in the first 30 minutes of tests 3, 4, and 5, development is interpreted to be having an effect on the compaction skin. In such a case, the final recommended steps are to:
    a. Purge the well of the water from the slug.
    b. Add a new clean slug.
    c. Conduct one 30 minute surge operation followed by purging.
    d. Add a new 2 gallon slug and conduct another falling head test.
    e. If the slug is seen to be falling at rates similar to the previous falling head test, development can be interpreted to be complete.
    f. If the slug is seen to be falling at a higher rate, then repeat bullets 6a through 6f.

3.0 STAGE III

3.1 SUMMARY OF ACTIVITIES

Field work to construct the wells for this stage started on June 14, 2013 and concluded on September 12, 2013. This included 59 field days. Approximately 131 hours (equivalent to approximately 14 days) were lost due to various reasons, including: lack of support, weather, and work package revisions. (See Appendix H for copies of the Drilling and Sampling Daily Work Records – Stage III).

PL-36472-OP-0002 provided the description of work for Stage III activities (see Appendix B). Direct push technology was used to place 2.625 in. OD pushes at four sites south of the 241-SX tank farm. The four boreholes were arranged in a 4 × 8 ft "box" to allow any of the four locations to be utilized as an extraction well or monitoring well and the eastern edge of the box was located within 5 ft of C8761. Using the geophysics from C8761, the target zones for the four wells were projected to be at 120 to 130 ft bgs in the individual locations.

The boreholes were driven to approximately 150 ft bgs. To reduce compaction in the anticipated zone of interest, the sampling string and sampler were utilized to advance the borehole through the 6 ft of the zone of interest. The recovered soil from the sampling string was disposed of in an onsite waste barrel. To reduce overall costs and improve efficiencies, logging was only performed from 90 ft bgs to total depth. Standard logging suites were used to collect gamma information and volumetric water content in each borehole. These logging suites consisted of a combination tool of LaBr/BGO for gross gamma and spectral gamma analysis, and a neutron-neutron detector.

After log data collection and processing, the data was reviewed to:

- Determine if the sediment type and bedding thickness were sufficient to meet extraction goals.
- Identify the borehole to be used for extraction and the three boreholes to be used for monitoring boreholes.
- Identify the precise depth for placement of the screen and packer assemblies.

A well screen and packer assembly was placed in the zone of interest in each borehole. Testing and well development was performed. Section 3.4 contains additional information on the placement of the well screen and packer assemblies, and Section 3.5 contains additional information on the testing performed.

After the testing and well development activities were completed, surface seals and connections to the surface extraction system were installed. Energy*Solutions* also provided ongoing field support to the project as the test continued. This support consisted of daily checks of the test equipment, sampling, and assistance as needed to modify or replace portions of the test equipment. This support work started on October 7, 2013 and included 46 field days, ending on

January 23, 2014. Results from the pore water extraction testing are not included with this report.

3.2 DIRECT PUSHING

Boreholes were driven using a hydraulic hammer system. Four boreholes were pushed using a 6.67 cm (2.625 in.) OD × 4.76 cm (1.875 in.) ID casing at predetermined locations to the specified depths, or refusal. When the borehole was in the zone of interest, as defined by the project, the standard sampling string was used to minimize the compaction of the borehole wall. The sampling string was used for three 2-ft sections (for a total of 6 ft) in each of the four direct push locations (C8823, C8824, C8825, and C8826).

3.3 GEOPHYSICAL LOGGING

Energy *Solutions* and Three Rivers Scientific conducted geophysical logging data collection and analytical services on the boreholes. A portable small diameter logging system was used to collect spectral gamma, gross gamma, and moisture data from the bottom of the borehole to 90 ft bgs. Calibration details, log data information, and data interpretation, as well as copies of the collected and processed data for the Stage III probe holes are provided in Appendix I. As stated above, only a portion of each of the four boreholes was logged (90 ft bgs to total depth). This interval was deemed sufficient to provide enough subsurface features to ensure accurate correlation to C8761, and provide detailed information relating to the target zones.

3.4 WELL SCREEN AND PACKER ASSEMBLIES

Extraction of moisture-bearing vapors from a given layer or geologic horizon requires a borehole construction method which allows negative pressure to be applied to the correct zone in the subsurface, and which seals the area above and below the target from the pressure effects. Additionally, a system to collect and pump the extracted water to the surface after removal from the formation is necessary. Included in the design requirements and operational planning was the goal that all of the subsurface equipment could be placed inside the working dimensions of the direct push slim hole tubing (1.875 in. ID).

During planning for the pore water extraction testing, WRPS contracted PNNL to conduct modeling and bench-scale testing of the soil moisture extraction concept, and to provide modeling information for use in selection of the zone for extraction, input on the design of the screen assemblies to place in the four wells, and parameters for operation of the extraction wells.

Multiple initial design and extraction concepts were proposed and evaluated prior to selection of the final design. The initial conceptual design plan consisted of a sealing system of inflatable packers on both sides of the screen interval, a sump, screen and riser, and a small-dimension pump for removal of the collected fluids.

The final configuration was a combination of non-deformable cement seals to seal the sump portion of the well and an inflatable packer for sealing the area above the screened extraction zone.

3.4.1 Design of Well Screen and Packer Assemblies and Construction Planning

Major factors of the extraction concept were:

- All materials and extraction devices had to pass freely through the drive tubing which had a 1.875 nominal ID.
- No extraction system was commercially available in the above dimensions. This restricted availability of items and materials that could be successfully placed into the tubing and caused difficult subsurface working conditions.
- The extraction zones required impermeable seals above and below the screen systems through which the vacuum would be applied to the formation.

The project team members expressed concerns about the initially proposed lower packer seal below the bottom of the screen. After discussion of various construction issues and fabrication restrictions, the recommended design was to replace the lower packer with a cement seal. Other design changes made included shortening the screen length to 1 ft, and reducing the screen slot size to ten slot from the 2-ft length, 20 slot screen utilized in Stages I and II testing.

The lack of space available in the annulus (area between the borehole wall and the screen/sump assembly) required that the material (cement) be placed into the bottom of the hole first and the sump portion of the assembly be displaced (pushed) into the cement. This was identified as a potential risk, as a very small variance in cement volumes could result in displacement of cement into the screen interval. To reduce the risk, numerous trial runs were conducted at the Energy*Solutions* shop area to establish precise cement volumes, mixing ratios, and to provide a reliable set of working instructions to guide activities in the field.

3.4.2 Installations of Construction Assemblies

Four sets of identical riser, packer, screen, and sump assemblies (hereafter called construction assemblies) were installed into the four boreholes. After installation, falling head testing was conducted in accordance with the conclusions and recommendations from testing conducted during Stages I and II (Section 2.7). This testing revealed complications to the installations of three of the four wells. As the sump was pushed into the cement, the cement rose in the annulus and covered portions of the screen intervals.

During construction, no material was detected during measurements inside the sump. Measurements taken several days after the placement of the construction assemblies were the first indication that materials had entered through the screens. Because no measurements were possible in the annulus, the amount of screen interval compromised is not known. In well C8823, approximately 0.8 ft of cement was measured in the sump and the conclusion is that some amount of cement rose above the bottom of the open screen interval and entered the well. In well C8824, no material was noted inside the well and the assumption is that no cement rose above the bottom of the screen interval. For well C8825, the cement material inside the casing

was measured to be within 0.2 ft of the top of the screen. This measurement demonstrates that the sump and 80% of the screen are full of cement. In well C8826, approximately 1 ft of cement was noted inside the sump the day after the placement of the construction assembly. See Figures 5 through 8 for as-built drawings depicting the construction details of each well (C8823 through C8826).

It is assumed that the above noted complications indicate that the cement infiltration through the screens did not occur immediately. Before placement of the cement and screen assemblies/risers, each well was measured to ensure that the borehole was open and ready for the installation. A measured amount of cement was then placed into the bottom of the well by use of a dump bailer. The screen assemblies and risers were then placed into the well bore and displaced (pushed) into the cement. Measurements were taken down the borehole after the installation of the screen assemblies and risers. No material was detected inside the sump or screen after the placement of the construction assemblies in any of the four wells. No materials were detected inside the sump until the wells were re-measured several days later at the initiation of well development activities. The conclusion is that after placement of the cement, and before, or as the construction assembly was placed into the cement, formation materials caved into the borehole and mixed with the cement, causing an increase in the cement volumes. This increase in cement volume was sufficient to cause it to rise into the screen interval in three of the four wells. It is also surmised that the addition of the sand/silt formation material into the cement caused the cement fluid viscosity to rise sufficiently to not allow immediate ingress through the well screens which is why the infiltrations were not identified at the time of placement.

3.5 FALLING HEAD TEST DATA AND INTERPRETATION

Following the placement of the screen assembly, the well development process of purging and surging was performed as described in Section 2.7.

Wells depths were measured and an In-Situ Inc.® Level Troll 700 transducer was utilized to monitor water levels within the wells during testing. The testing sequence data was collected and GSI provided interpretations of the data. Plots of the falling head data as well as an interpretation of the data are provided in Appendix J. A discussion on the well development and falling head testing on each borehole is provided below.

3.5.1 C8826

Well C8826 was the first of the four Stage III wells in which development efforts were conducted. In total, eleven individual falling head tests and surge/purge sequences were performed in well C8826. The repetition of testing and purging was the result of the inconclusive results and data plots collected. Figure 9 shows the normalized data plot of the multiple tests performed during the attempt to break down the sidewall compaction zone.

The falling head and purging steps were repeated with minor modifications to the process and to the equipment in an effort to effect change and derive data plots similar to those in Figure 4 (from the initial falling head tests done in C8761). Throughout all of the repeated attempts to

increase the effective borehole wall permeability, little or no improvements were observed. In fact, the initial test and test 4 had the best effective infiltration rates.

Figure 5. As-Built Drawing for C8823.

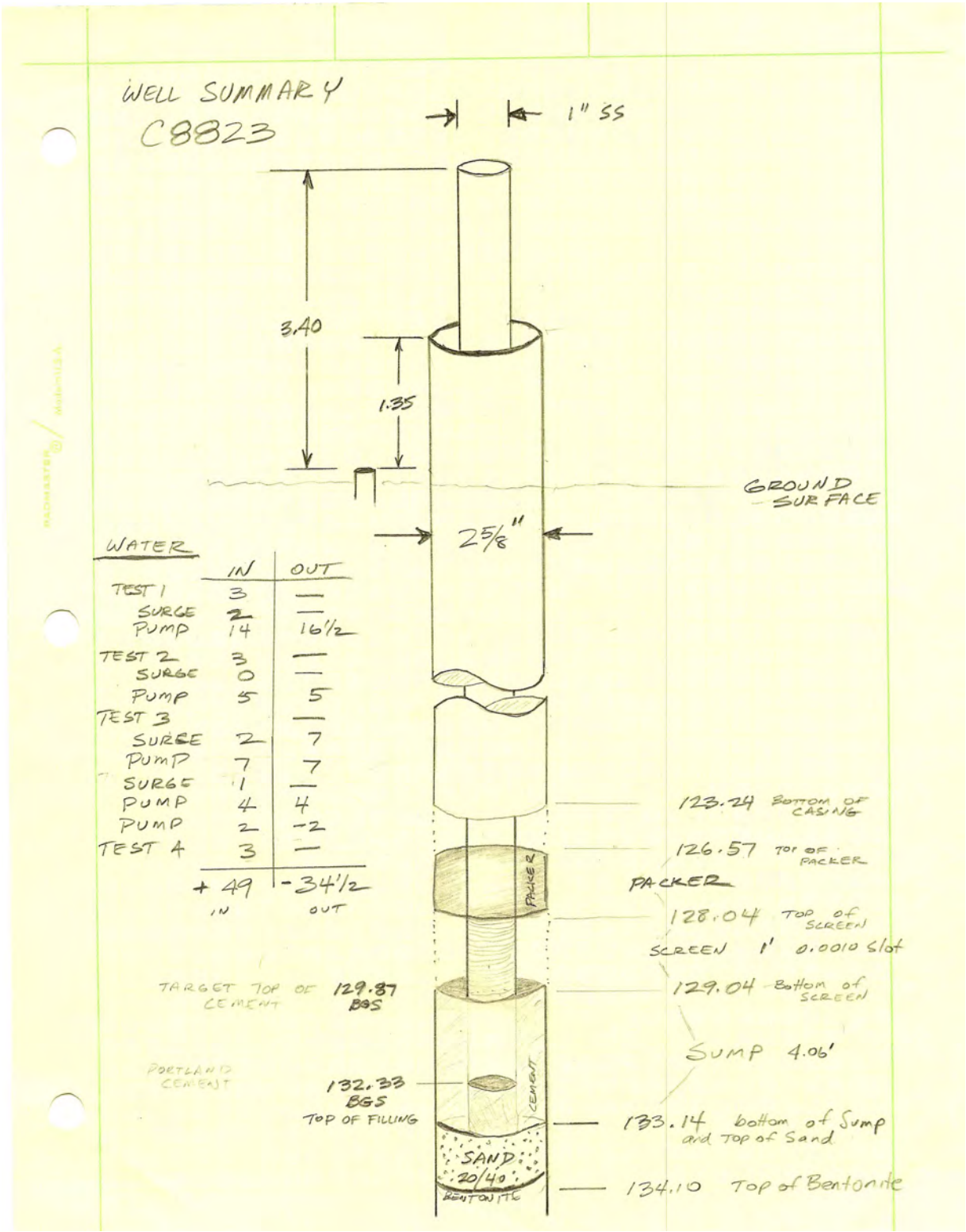


Figure 6. As-Built Drawing for C8824.

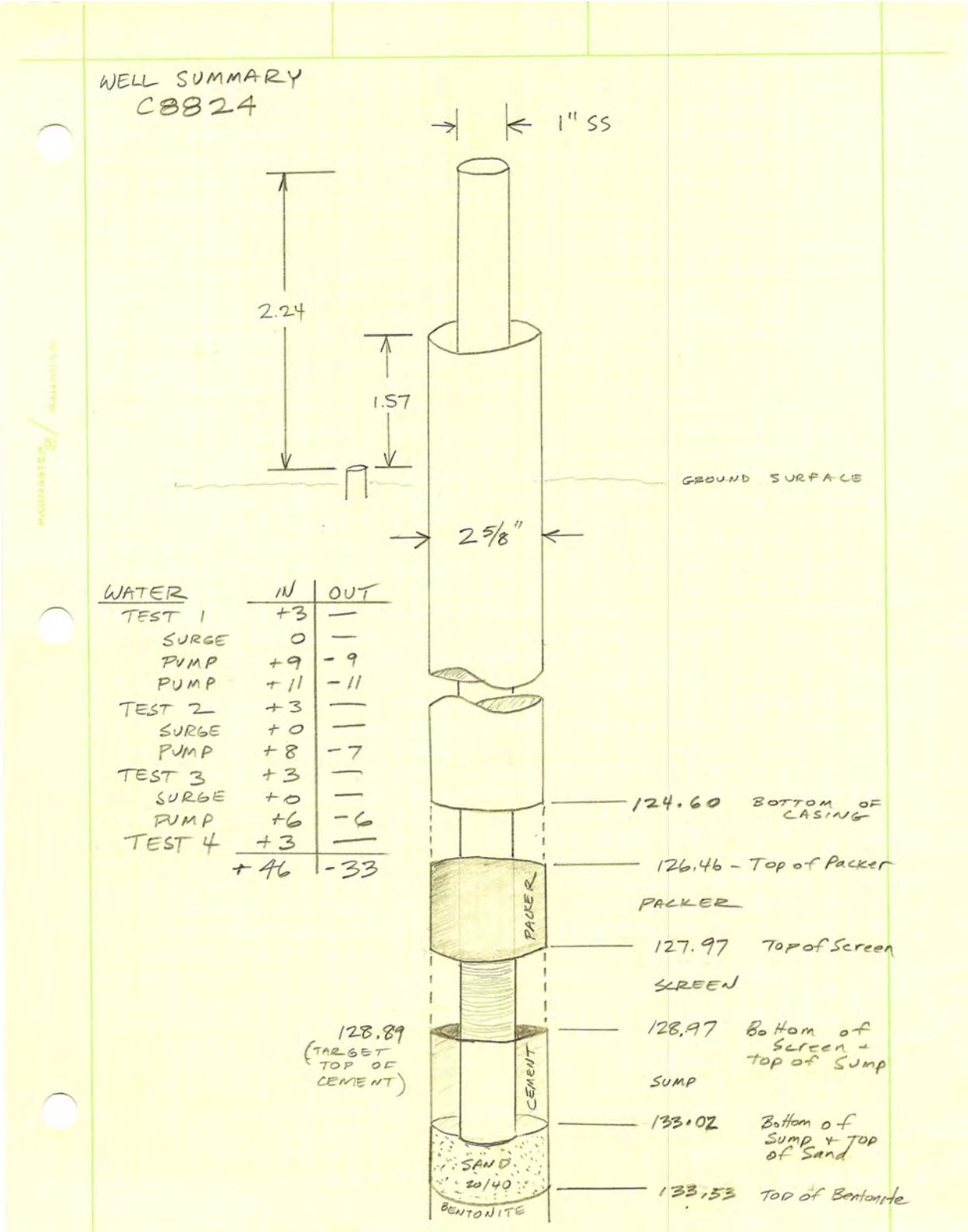


Figure 7. As-Built Drawing for C8825.

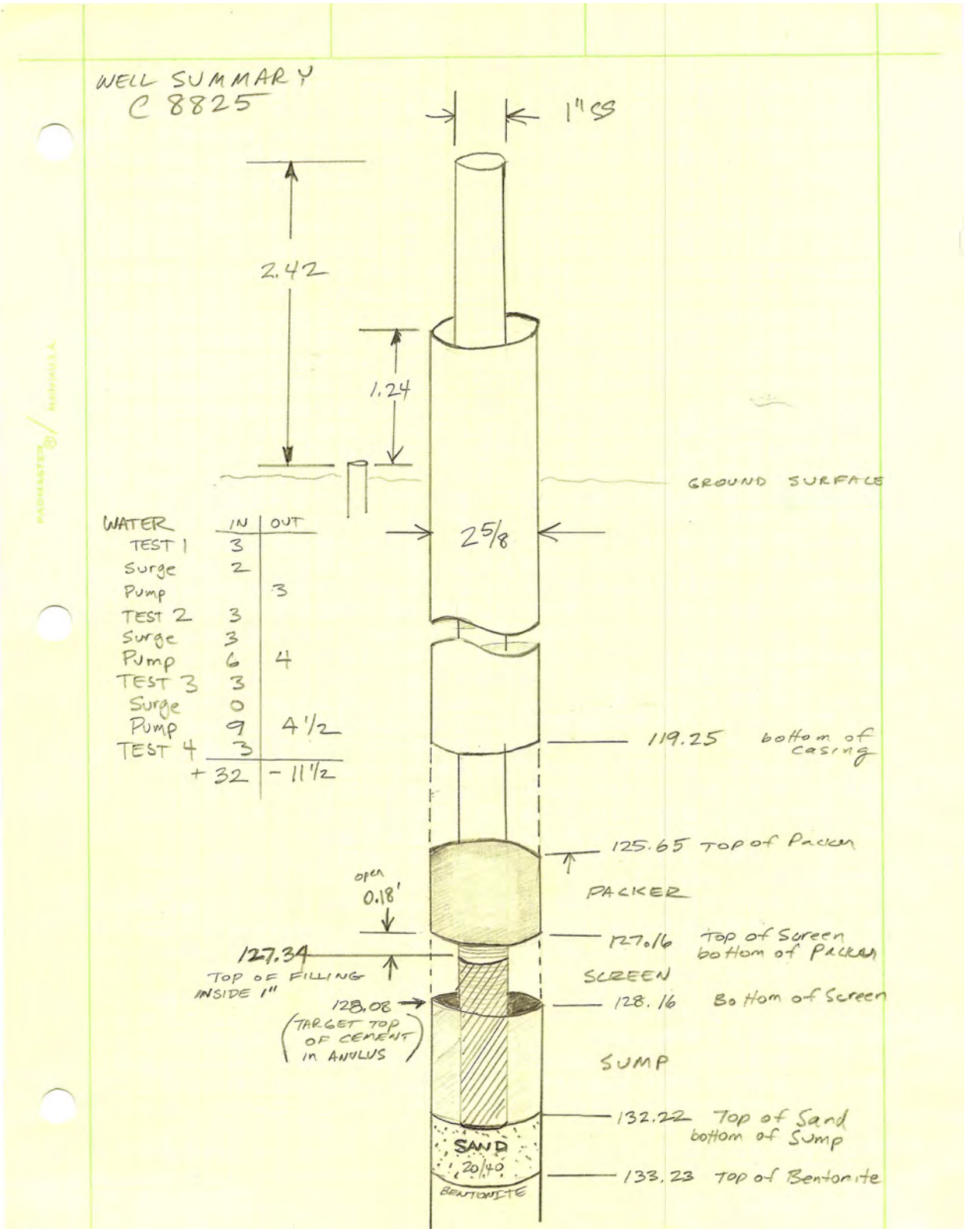
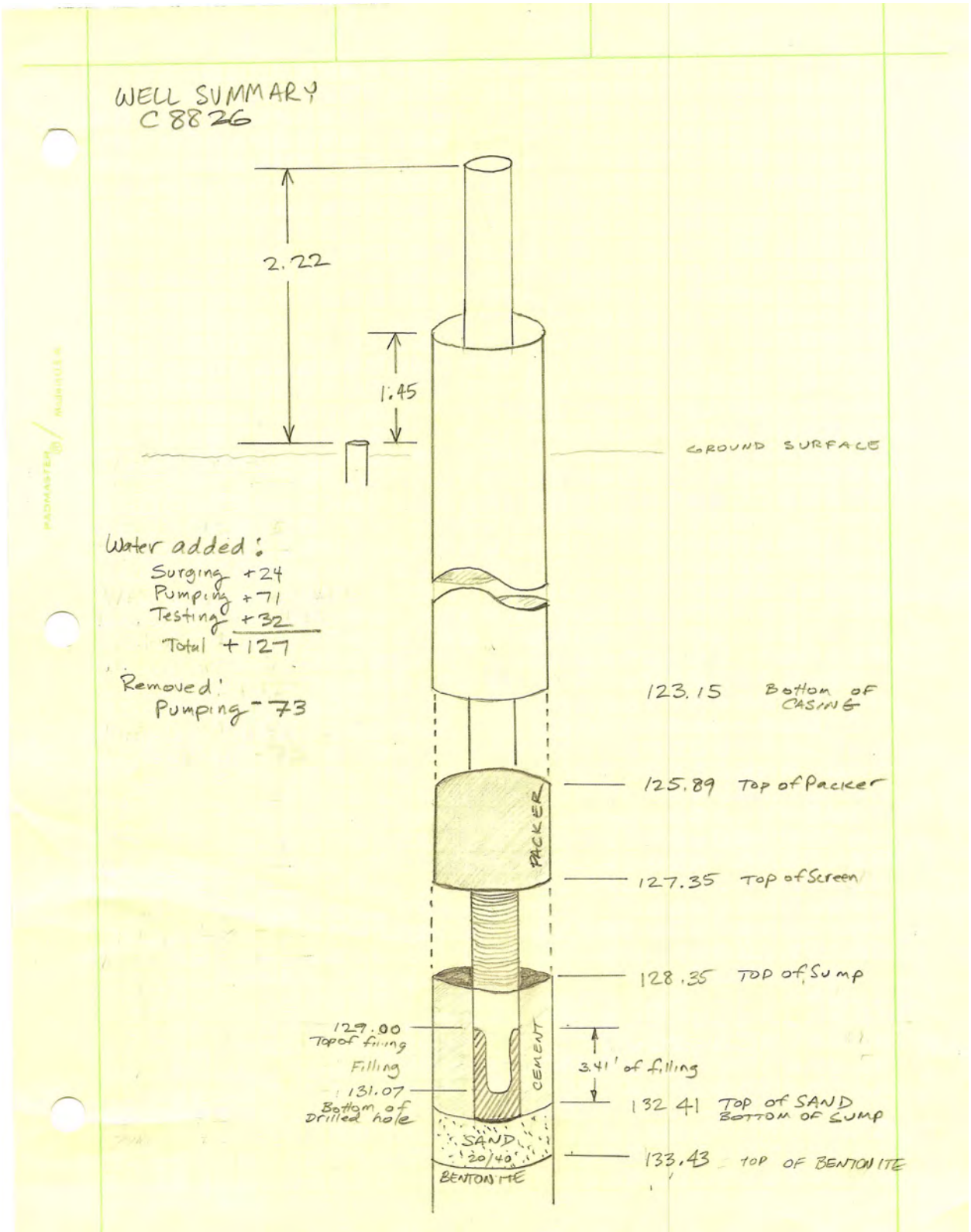


Figure 8. As-Built Drawing for C8826.



None of the curves depicted in Figure 9 show the improvement or curve profile shown for tests 3 through 5 in Figure 4.

3.5.2 C8825

Figure 10 shows the normalized well responses from the four falling head infiltration and purge cycles performed on C8825. None of the curves match the pattern expected or meet the development goal from the testing done in C8761. Test number two had the fastest rate of decline and the remaining three have the long, nearly flat, time span with a very slow rate of decline between 100 and 1000 seconds into the test duration. These responses demonstrate that the surge and purge (bailing of fluids and materials) from the sump portion of the well did not producing results similar to the actions performed in C8761.

3.5.3 C8824

Figure 11 depicts the normalized responses from four falling head and surging/purging cycles in well C8824. No significant improvements were achieved from the process. Test number one had the fastest initial decline in head and the subsequent three tests had prolonged delays in the head decline in the 100-1000 second time frame.

3.5.4 C8823

Figure 12, the normalized graph of four falling head tests conducted in well C8823, clearly shows that all three tests had no affect on borehole permeability. It demonstrates that the surging produced no reduction in the borehole wall compaction and most likely produced plugging of the screen and/or the borehole wall with fines.

3.6 CONCLUSIONS AND RECOMMENDATIONS

During Stage III, in all four boreholes, the well development process had no effect on the compaction in the borehole wall or increasing the effective permeability. In fact, the permeability appeared to go down as the testing and purging progressed. There are several issues that may have contributed to these results:

- The wells were constructed with 1 in. nominal ID risers with 1.33 in. ID screens and sumps. The surge block/slug rod had to fit through the 1 in. ID riser, but had excess room in the 1.33 in. ID screen and sump. This reduced the compression wave in the fluid as the surge block was moved up and down in the screen section, reducing the effectiveness of the surging process.

- The screen section was changed from the 2 ft/20 slot tested in C8761 (Stages I and II) to 1 ft/ten slot for the four extraction wells in Stage III. The reduction in length was intended to keep the extraction vacuum centered within the target zone to reduce the chances of breakthrough and channeling of the vapor pathway into the well from the adjacent, less saturated sediments. The slot size reduction was based on concerns that the larger sized, 20 slot openings would allow excess sediments into the screen and sump, and damage or plug the water extraction pumping system.

Figure 9. Hydrograph of C8826 Falling Head Testing.

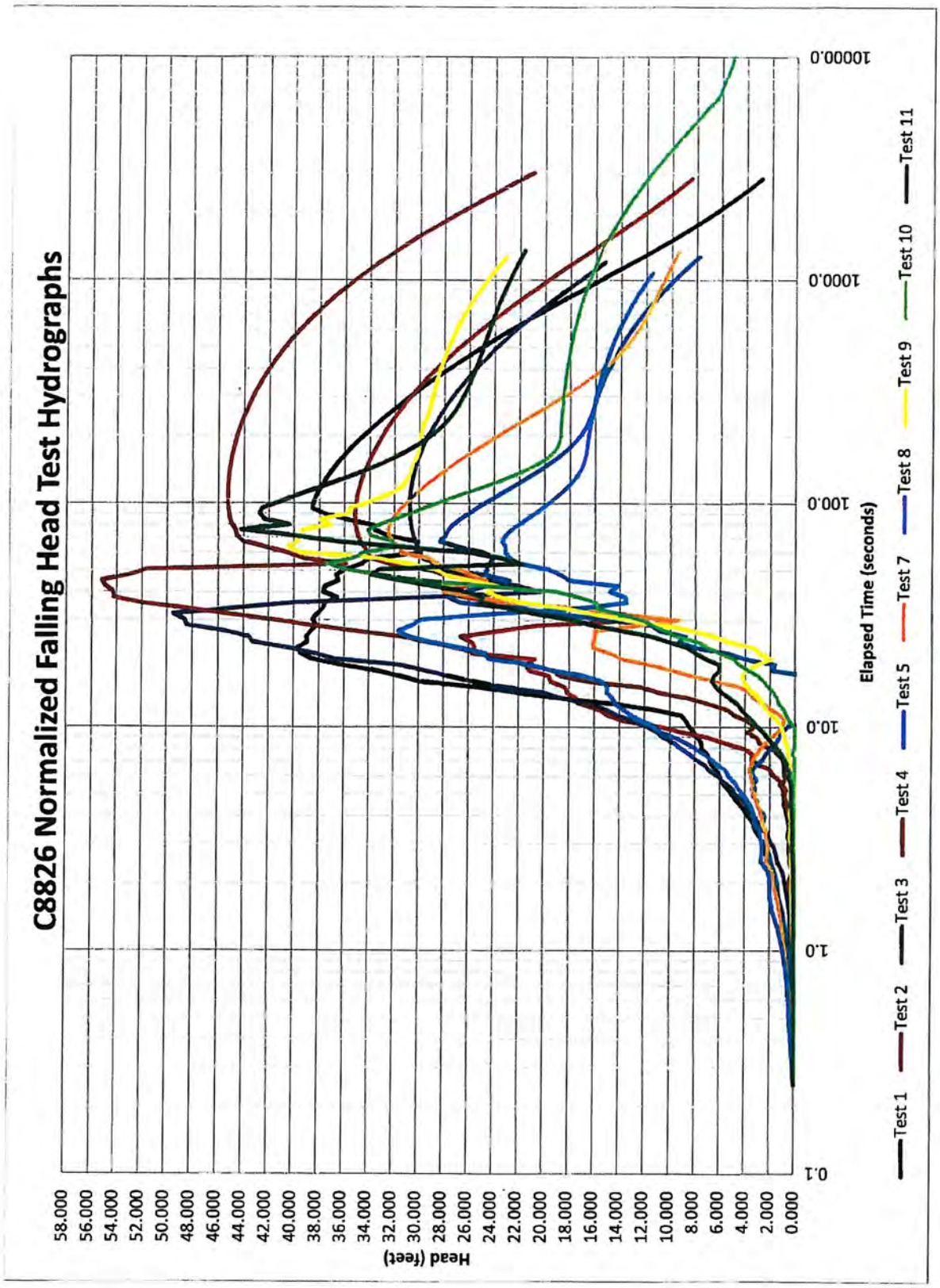


Figure 10. Hydrograph of C8825 Falling Head Testing.

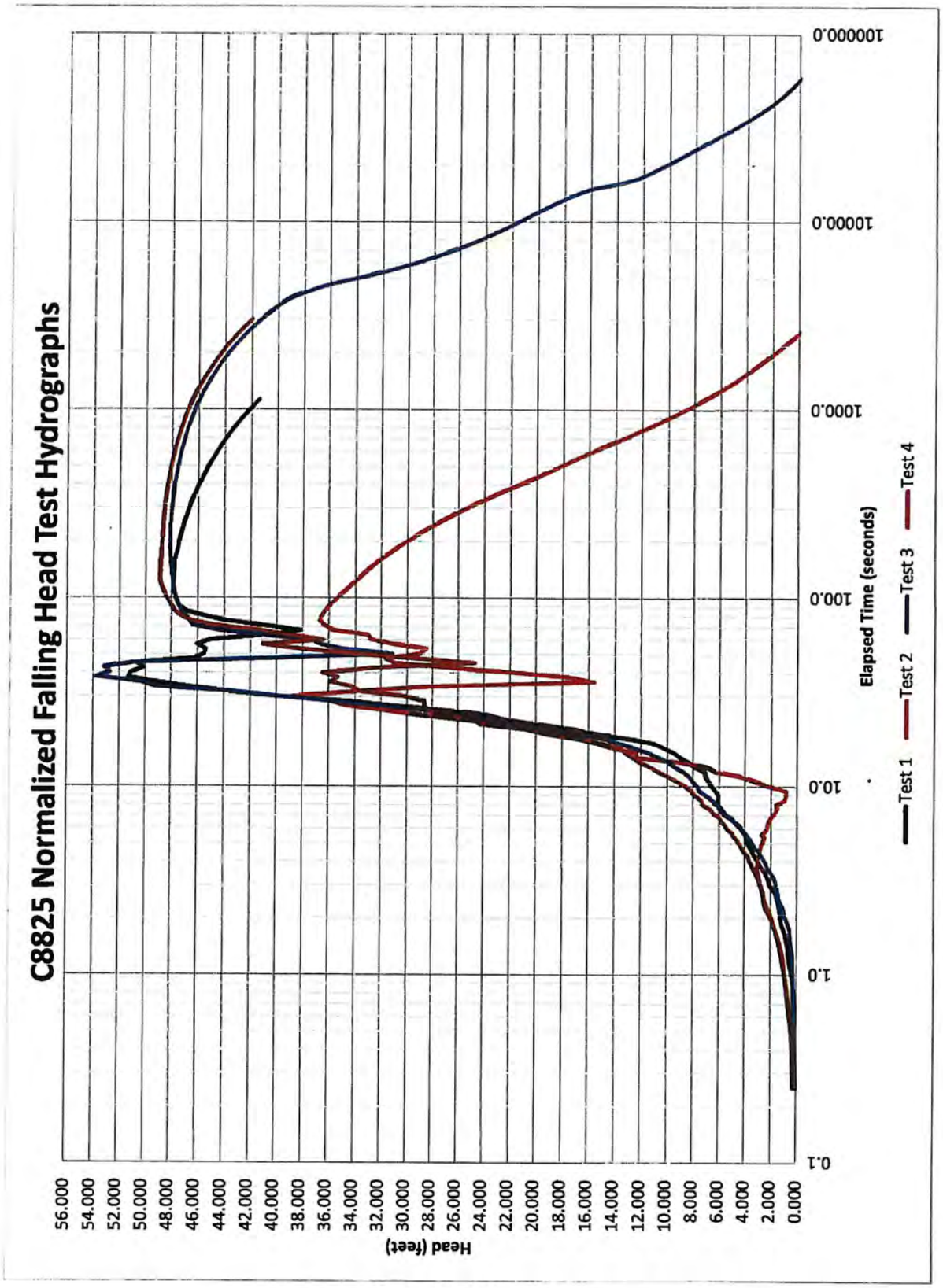


Figure 11. Hydrograph of C8824 Falling Head Testing.

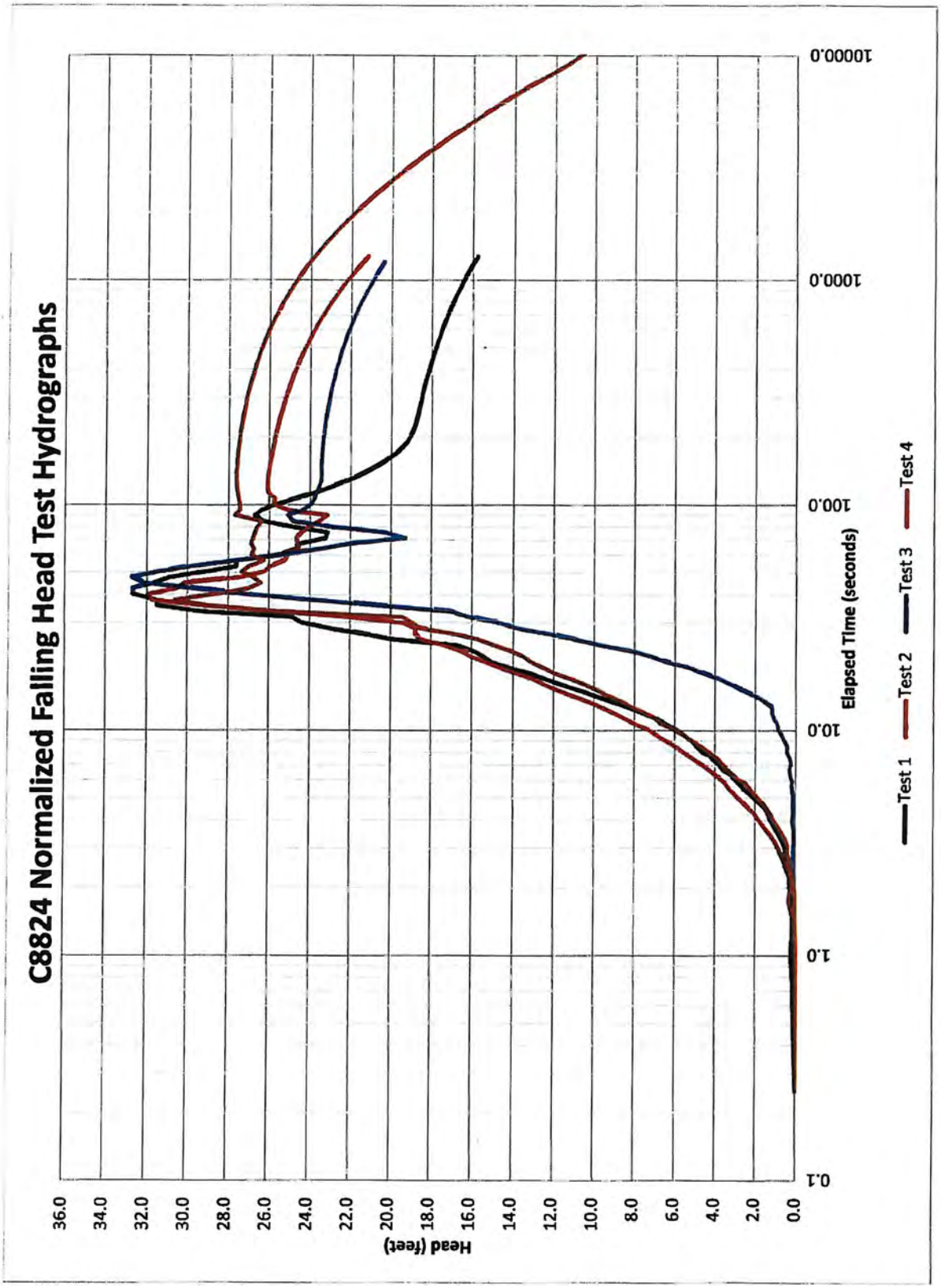
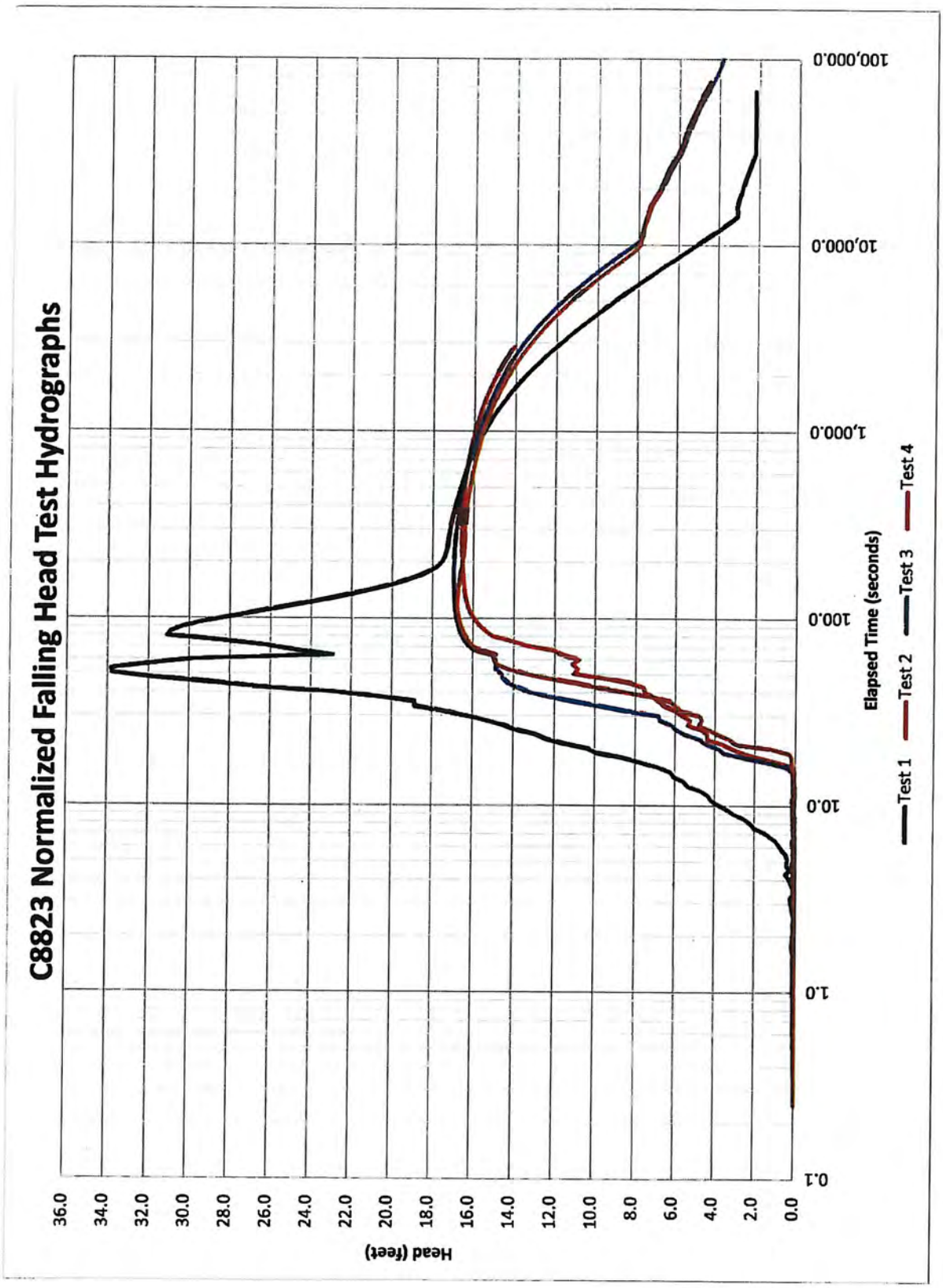


Figure 12. Hydrograph of C8823 Falling Head Testing.



- The decrease in slot size contributed to the reduction of surging energies for development of the borehole wall.

- Observations during the bailing process indicate little or no material (sand or silt) was removed from the well (i.e., no materials entered the well through the well screens). This can be attributed to: 1) the reduced slot size, or 2) the problems with the construction where significant portions of the screen interval were subjected to infiltration by cement during the placement of the construction assembly into the cement at the bottom of the wells.

- During operation of the vacuum system, one or more of the packer systems failed to maintain pressure. These failures could have been manufacturing flaws, as the systems were custom-made to fit in the extremely tight dimensions of the 1.875 in. ID of the well, but the precise cause and nature of these failures is not known.

To overcome the issues noted above, several changes should be made prior to any additional testing:

- The overall working dimensions of the well need to be enlarged. A larger borehole size would allow the construction assembly to be cemented into place using a tremie pipe to place cement down the hole around the assembly. This would eliminate the problems caused by pushing the construction assembly into cement at the bottom of the hole.

- The increase in size should be accompanied with a uniform ID/OD for the construction assembly (see the first bullet in the discussion of issues, above) to maximize surging pressures from the well development process. The screen system should be returned to the 20 slot opening size to ensure that surging energies are more efficiently applied to the borehole wall. Both of these changes would increase the breakdown of the compaction zone and improve borehole wall permeability.

- Increasing the working dimensions for well placement would also allow the use of non-deformable seals above the screen after well development. This would eliminate the mechanical failure issue with the packer system.

4.0 BOREHOLE DECOMMISSIONING

Decommissioning of the boreholes from Stages I and II were conducted in accordance with the *Washington Administrative Code* (WAC) 173-160 requirements. While decommissioning the boreholes, the tubing was back-pulled while granular bentonite was simultaneously added to the tubing until it reached the surface. Resistivity probes were installed in one borehole, C8761. A protective steel casing was cemented in place approximately 30.48 cm (12 in.) deep at the surface to protect the protruding probe wiring. The State of Washington, Department of Ecology (Ecology) documentation is provided in Appendix K.

Stage III boreholes have not yet been decommissioned as they are being used for the pore water extraction testing. Table 4 shows the logged and sample boreholes, coordinates, pushed depths, and resistivity probe placement depths, as applicable.

Table 4. Borehole Information.

STAGES I and II					
Borehole # / Type	**Northing (meters)**	**Easting (meters)**	**Elevation (meters)**	**Hole Depth (ft)**	**Probe Depth (ft bgs)**
C8757 / Logging	134461.04	566854.46	NA	11.5	NA
C857A / Logging	134133.19	566 771.96	199.05	11.5	N/A
C8757B / Logging	134133.01	566773.99	199.01	11.5	NA
C8759 / Logging	134127.93	566814.86	199.42	152.0	N/A
C8760 / Sampling	134127.68	566815.91	199.34	127.0	NA
C8761 / Logging	134133.01	566826.92	199.63	152.0	88, 108, and 127 ft
C8762 / Sampling	134132.90	566827.82	199.56	129.0	N/A
STAGE III					
C8823	134133.30	566824.06	199.56	153.0	N/A
C8824	134133.16	566825.33	199.58	153.0	N/A
C8825	134130.76	566825.13	199.48	153.0	N/A
C8826	134130.78	566823.90	199.44	153.0	N/A

5.0 GLOBAL POSITIONING SATELLITE SURVEYING

With the use of a Trimble® 5800 Global Positioning Satellite Survey system, or equivalent equipment, the original locations of the exploratory boreholes were identified using paint and stakes. Once the task was completed and the boreholes were decommissioned, each exploratory and sample borehole was recorded for accuracy. These recorded coordinates were placed on a map showing their locations in direct relation to the underground storage tanks in the vicinity. The coordinates, elevation, and a map showing completed push locations/boreholes are provided in Appendix L.

6.0 ENVIRONMENTAL, SAFETY AND HEALTH

During the SX Tank Farm activities, Energy*Solutions* Operations Safety personnel performed job site surveillance for safety and health compliance. The results of a surveillance performed by Energy*Solutions* are provided in Appendix M. The work scope conducted under the subject Statement of Work was completed with no lost time, reportable *Occupational Safety and Health Act of 1970* injuries, or first aid cases, and there were no incidences of equipment or personnel radiological contamination.

7.0 REFERENCES

ATL LO-080-156, Cleaning of Containers and Sample Collection Equipment, 222-S Laboratory, Washington River Protection Solutions, Richland, Washington.

GG-NW-DOW-001, *Description of Work: SX Pore Water Extraction – Stage I*, Rev. 0, Energy*Solutions* Government Group, Northwest Operations, Richland, Washington.

GG-NWOP-RO-1858, *Hanford SX Tank Farm Pore Water Extraction Stage I*, Energy*Solutions* Government Group, Northwest Operations, Richland, Washington.

PL-36472-OP-0002, *Description of Work – SX Pore Water Extraction – Stage III*, Rev.0, Energy*Solutions* Government Group, Northwest Operations, Richland, Washington.

RPP-PLAN-53808, 2012, *200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan.* Washington River Protection Solutions, LLC, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq.

Occupational Safety and Health Act of 1970, 29 USC 651 et seq.

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells," *Washington Administrative Code*, as amended.

This page intentionally left blank.

APPENDIX A

DESCRIPTION OF WORK
SX POREWATER EXTRACTION – STAGE I

This page intentionally left blank.

ENERGYSOLUTIONS GG-NW-DOW-001

Description of Work: SX Pore Water Extraction – Stage I

Revision 0

Authored By: P. C. Berlin, Scientist — Date: 1/2/13

Reviewed By: K. D. Reynolds, Senior Scientist — Date: 1/2/13

Approved By: M. G. Gardner, Manager, Washington Operations — Date: 1/2/13

Approved By: K. D. Hutchings, Safety — Date: 1/2/13

- [X] New
- [ ] Title Change
- [ ] Revision
- [ ] Rewrite
- [ ] Cancellation

Effective Date _____

GG-NW-DOW-001
Rev. 0

DESCRIPTION OF WORK: SX PORE WATER EXTRACTION STAGE I

January 2013

Prepared for
Washington River Protection Solutions, LLC

by
Technical Services
Energy*Solutions* Government Group, Inc., Northwest Operations

CONTENTS

FIGURES

TABLES

TERMS

bgs	below ground surface
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
DOW	description of work
Energy*Solutions*	Energy*Solutions* Government Group, Inc., Northwest Operations
ES&H	Environmental, Safety, and Health
ID	inside diameter
GPR	ground penetrating radar
OD	outside diameter
RCRA	*Resource Conservation and Recovery Act of 1976*
RPP	River Protection Project
SST	single-shell tank
WAC	*Washington Administrative Code*
Well ID	Well identification
WMA	Waste Management Area
WRPS	Washington River Protection Solutions, LLC

GG-NW-DOW-001
Rev. 0

DESCRIPTION OF WORK: SX PORE WATER EXTRACTION STAGE I

1.0 INTRODUCTION AND BACKGROUND

1.1 GENERAL DESCRIPTION

There are 177 large, underground tanks located at the Hanford Site, 149 of them are single-shelled. These tanks and their associated facilities are grouped into 12 "tank farms." The tanks were used for storage of some of the most dangerous and hazardous waste produced during the processing of irradiated fuel to obtain plutonium. Tank farms were located downhill from chemical separations plants so that the wastes would gravity-flow to the tanks. Six single-shell tank (SST) farms (241-S, 241-SX, 241-T, 241-TX, 241-TY, and 241-U) are located in the 200 West Area of the Hanford Site. This Description of Work (DOW) focuses on the SX tank farm and an investigation related to extraction of potentially contaminated pore-water from under and adjacent to the SX tank farm. This DOW provides the work instructions for conducting characterization and sampling efforts for Stage I of the SX Pore Water Extraction as listed in RPP-PLAN-53808, Rev. 0 or latest revision. The scope of work includes: providing equipment and personnel to conduct direct push activities; supporting soil sample collection by Washington River Protection Solutions, LLC (WRPS) sampling personnel; providing safety oversight; providing geophysical logging services; performing falling head tests and borehole wall manipulation activities in selected zones of the exploration boreholes; attending meetings and planning sessions; and providing a written report documenting field activities and data collection at the conclusion of the scope of work. This work is being conducted at the direction of WRPS Closure and Corrective Measures group.

1.2 BACKGROUND

The U.S. Department of Energy (DOE) assigned the River Protection Project (RPP) Single-Shell Tank Program the tasks of transferring waste from the SST to double-shell tanks, and developing and implementing a strategy to retrieve SST waste and miscellaneous underground storage tank waste. The WRPS Closure and Corrective Measures group was given responsibility for collecting and providing subsurface data from the SST farm facilities. This contributes to preparation for the eventual retrieval of the tank waste. The intent of the SST Waste Management Area (WMA) characterization program is to collect and analyze samples to provide an understanding of the distribution and movement of contaminants in the vadose zone under and adjacent to the tank farms. These SST farms are designated as Radiological Buffer Areas or Contamination Areas.

The SX tank farm is believed to have been associated with tank waste losses to the soil column as a result of overfilling, leaks from ancillary equipment, and/or leaks from the tanks themselves. Detailed estimates of soil waste inventories have been prepared for this tank farm and are

documented in various reports identified in RPP-PLAN-53808, *200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan.*

The initial field testing of soil desiccation/contaminant removal technology called out in RPP-PLAN-53808 includes testing referred to as Stage I Pore Water Extraction. The purpose of the Pore Water Extraction testing is to determine if the technology has potential to remediate identified contamination. Stage I will characterize the study area for selection of a test site and provide technical information for performing a proof-of-principle test of soil desiccation/contaminant removal using direct push equipment.

Results of previous soil investigations at SX tank farm indicate the presence of contamination within the vadose zone. The most effective way to mitigate risk associated with this contamination is through restriction of groundwater recharge using interim surface barriers or removing contaminants in the vadose. RPP-7884, *Field Investigation Report for Waste Management Area S-SX*, indicates future risk is best mitigated by reducing both the subsurface moisture content and the soil contaminant inventory. Previous work completed at T and TY tank farms resulted in the installation of interim surface barriers to reduce soil moisture. The work planned in this document evaluates the potential to reduce the subsurface soil moisture and contaminant inventory through pore-water and vapor extraction.

1.3 TANK FARM BACKGROUND

The SX tank farm was constructed between 1953 and 1954 and consists of 15 SSTs. The 241-SX tanks are arranged in rows of three tanks each, downhill from the chemical separations plants, each tank slightly at a slightly lower elevation than it's neighbor so that the wastes gravity-flow into the tanks. Each of the 241-SX tanks has a nominal 1 million-gal storage capacity, and consists of a carbon steel liner inside a reinforced concrete shell. The steel tank liner covers the 75-ft inner diameter tank bottom and sidewalls to a height of approximately 32 ft as measured from the tank center. The tank bottom is dish-shaped and slopes approximately 3.3% from the sidewall to the tank center (i.e., 14.875-in. elevation drop over 37.5-ft radius).

Ten of the tanks in the SX tank farm have laterals (cased borings) installed below the tank bottoms as part of the leak detection system. In addition to laterals, vadose zone monitoring wells (drywells) are installed throughout the tank farm for leak detection.

1.4 PHYSICAL SETTING

The SST tank farms were constructed in excavations into the near-surface sediments that overlie the Columbia River Basalt Group. The Columbia River Basalt forms the basement bedrock. There are approximately 169 to 179 m (555 to 590 ft) of continental sediments that overlie the basalt in WMA S-SX. From oldest to youngest, these deposits include the following.

- Columbia River Basalt Group
- Ringold Formation

- Cold Creek unit – lower carbonate rich sequence (CCU_l)
- Cold Creek unit – upper silt and sand sequence (CCU_u)
- Hanford formation – lower fine sand and silt sequence (H2 subunit)
- Hanford formation – middle coarse sand and gravel sequence, upper fine sand and top gravelly sand sequence (H1 subunit)
- Backfill

The general characteristics of these units are described in more detail in RPP-23748, *Geology, Hydrogeology, Geochemistry, and Mineralogy Data Package for the Single-Shell Tank Waste Management Areas at the Hanford Site*. All of the formations, except for the surface of the Hanford formation have a general tendency to dip west to southwest toward the axis of the Cold Creek unit. The SSTs at WMA S-SX were emplaced within the Hanford formation sediments of an upper sand-dominated (H1) subunit, and may locally intercept the upper portions of a middle gravel-dominated Hanford (H1) unit. The vadose zone beneath WMA S-SX is as much as 65 meters thick (213 ft) and consists of the Hanford formation, the Cold Creek unit, and the upper part of the Ringold Formation. Both the water table and the unconfined aquifer reside entirely within the Ringold Formation.

Sediments in the vadose zone vary from open-framework gravels of the gravel-dominated facies and interbedded sand and silt of the silt-dominated facies of the Hanford formation to calcium carbonate-rich deposits of the Cold Creek unit and cemented gravels of the Ringold Formation. These sediments are characterized by numerous lateral discontinuities, such as pinch outs, erosion truncations, and irregular flow patterns. If clastic dikes are present, they may enhance vertical flow patterns. Therefore, there are numerous possible avenues for contamination to migrate through the vadose zone (HNF-4936, *Subsurface Physical Conditions Description of the S-SX Waste Management Area*).

2.0 WORK SCOPE

For the Stage I activities Energy*Solutions* Government Group, Northwest Operations (Energy*Solutions*) will utilize a direct push technology to place exploratory and sampling pushes at three sites south of the 241-SX tank farm. At these sites the exploratory holes will be driven to refusal, which is anticipated to occur at 120 to 130 ft below ground surface (bgs). These exploration holes will then be utilized for collection of remote sensing geophysical log data. Gamma information, volumetric water content and soil formation temperature data will be collected with standard logging suites. These logging suites consist of a combination tool of lanthanum bromide and bismuth germinate oxide (LaBr/BGO) for gross gamma and spectral gamma analysis, a neutron-neutron detector, and an infrared casing temperature device.

The log data will be utilized to select intervals for sampling in separate pushes located 2-3 ft from the exploration locations. Two zones will be selected from each exploration borehole for investigation. The samples will be analyzed on a "quick-turnaround" basis for moisture content, nitrate and, technetium. After sampling has been completed and the sampling boreholes have been decommissioned, several testing activities will be undertaken in the exploration boreholes.

The casing will be withdrawn to provide open hole access to the zone sampled in the sampling borehole. A temporary screen and riser pipe will be placed in the zone of interest and instrumented with a piezometer. A "falling head test" designed for implementation in the vadose zone will be conducted by placement of 2-5 gallons of water per test. At least one test and possibly several tests will be performed. In addition to recording the falling head test data, the zone being tested will be surged in an attempt to modify or breakdown the compaction zone created along the borehole wall by the direct push methodology.

2.1 METHOD FOR BOREHOLE PLACEMENT

The method selected to outline the vertical and horizontal extent of contamination is a hydraulic hammer-driven push system on a tractor or track mounted type carrier. For this application, the locations for investigation (exploration) are selected through an iterative process as outlined in Section 3.0, "Push Locations." Data from the moisture and gamma logs collected from the exploration borehole will be used to determine sampling locations in the adjacent sampling push location. Approximately six samples will be collected in the three adjacent sampling push locations.

2.2 EXPLORATORY BOREHOLE

The exploratory activities are initiated by placement of a single tubing string that is 6.4 cm (2.5-in.) outside diameter (OD) x 4.45 cm (1.75-in.) inside diameter (ID) (e.g., the exploratory push). This tubing is advanced to the target depth or refusal. Geophysical logging with bismuth germinate oxide gamma and neutron-neutron moisture instrumentation is conducted. The logging data is reviewed by the WRPS Closure and Corrective Measures and Energy*Solutions* technical personnel to determine target sample collection points. After testing, the exploratory borehole will be decommissioned per applicable *Washington Administrative Code* (WAC) 173-160, "Minimum Standards for Construction and Maintenance of Wells," requirements (e.g., filled with bentonite or bentonite/cement grout as required) as the push tubing is extracted.

2.3 SAMPLE BOREHOLE

Sampling is conducted with outer push tubing that is 6.67 cm (2.625-in.) OD x 4.76 cm (1.875-in.) ID and inner tubing that is 3.81 cm (1.5-in.) OD x 2.54 cm (1.0-in.) ID. The dual wall system with a "dummy" tip is advanced to the predetermined sample depth. When the sampling depth is achieved, the entire tubing string (inner and outer casing) is back-pulled 0.06 m (approximately 2 in.) to 0.12 m (approximately 5 in.) to relieve pressure from the drive shoe and tip. The removable tip is removed by extracting the inner rods. When the inner string of tubing has been removed, a sampler is attached to the inner string and returned to the bottom of the outer casing/push tubing and positioned against the inner receiver face of the drive shoe. The inner and outer tubing strings are "locked" together by use of a proprietary method, and the entire assembly is advanced through the targeted sample interval.

The sampler body holds three stainless steel liners that are 3.17 cm (1.25-in.) OD x 2.7 cm (1.08-in.) ID. After the sampler is advanced approximately 0.6 m (2 ft), the inner string is released and retrieved to surface. The liners are removed from the sampler body and surveyed. Trained sample-handling technicians document recovery, sample condition, and volume recovery percent; then the samples are packaged and transported to the selected laboratory for analysis. The samples will be analyzed on a "quick-turnaround" basis for moisture content, nitrate, and technetium. The "dummy" tip is reattached to the inner string and returned to the bottom and placed in the casing shoe, and the entire assembly is then advanced to the next designated sample depth. This process is repeated until all requested samples have been collected or the tubing meets refusal.

Upon completion of the final sample extraction, or upon meeting refusal, the dummy tip or sampler is removed and the borehole is decommissioned per WAC 173-160 requirements, as described in Section 3.6, "Exploratory and Sampling Hole Decommissioning."

2.4 PLACEMENT OF BOREHOLES

Sites selected for the push locations are south of the SX tank farm fence line and are a portion of proof-of-principle testing to obtain moisture information and soil chemistry about three prospective test locations with characteristics similar to those anticipated beneath SX tank farm. The general location for the three prospective test locations, in relation to 200 West Area and the Hanford Site, is shown in Figure 2-1. Ground penetrating radar (GPR) and electrical ground scans will be performed before boreholes are pushed, to identify sub-surface infrastructure and support citing of the test boreholes. The combination of subsurface infrastructure and surface accessibility will be used to determine the exact location of each borehole. The push location will be staked by use of Global Positioning Satellite equipment and verified by a licensed land surveyor.

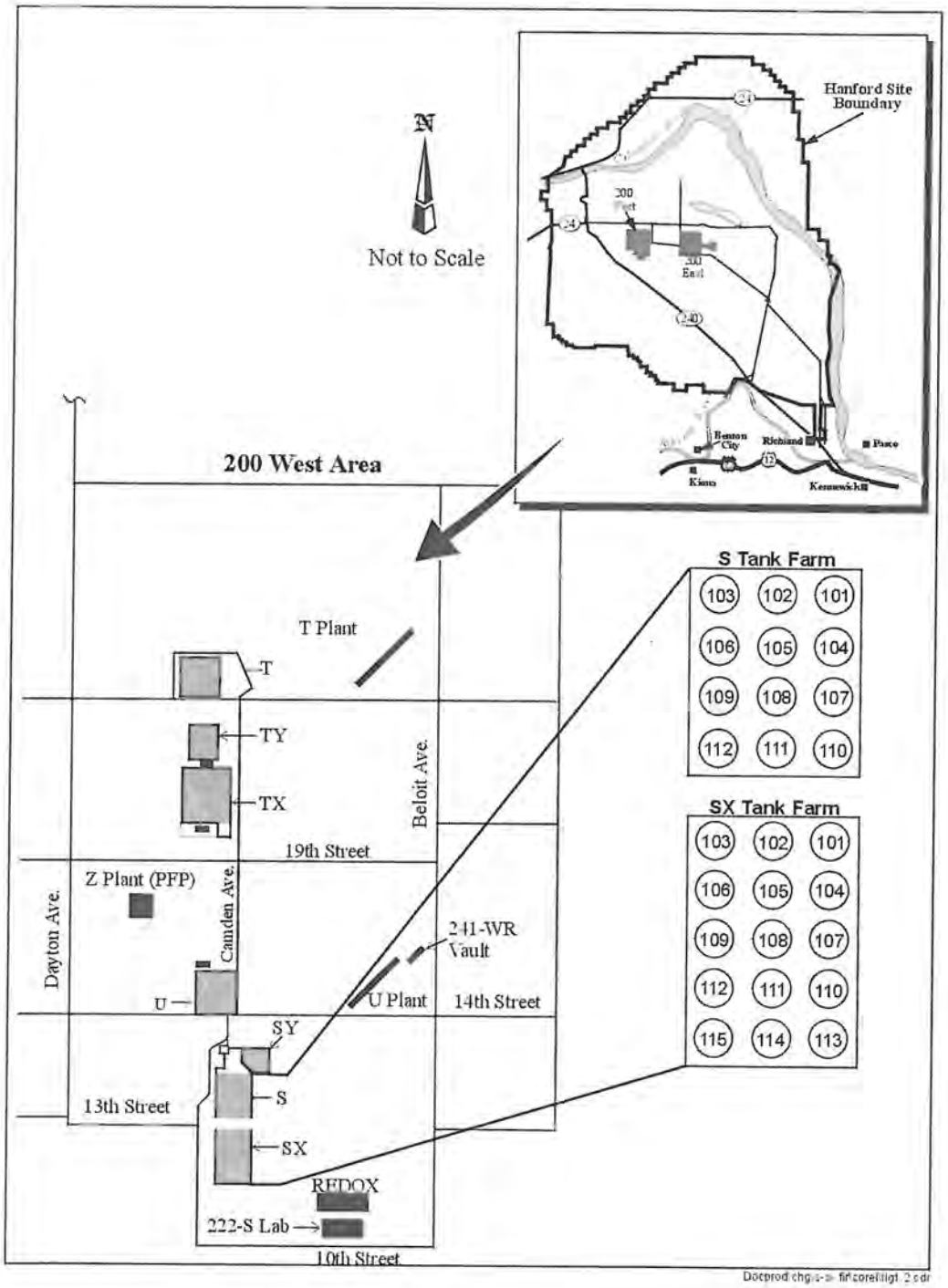
Table 2-1 contains the proposed co-ordinates and borehole numbers associated with each borehole location. Figure 2-2 shows a close-up location of the boreholes showing the southern fence line of SX tank farm.

Table 2-1. Coordinates of Boreholes for Stage I.

Site #	Borehole #	Use	Northing	Easting
#1	C8757	Exploration	134133	566773
	C8758	Sampling		
#2	C8759	Exploration	134127.9	566814.9
	C8760	Sampling		
#3	C8761	Exploration	134133.1	566827
	C8762	Sampling		

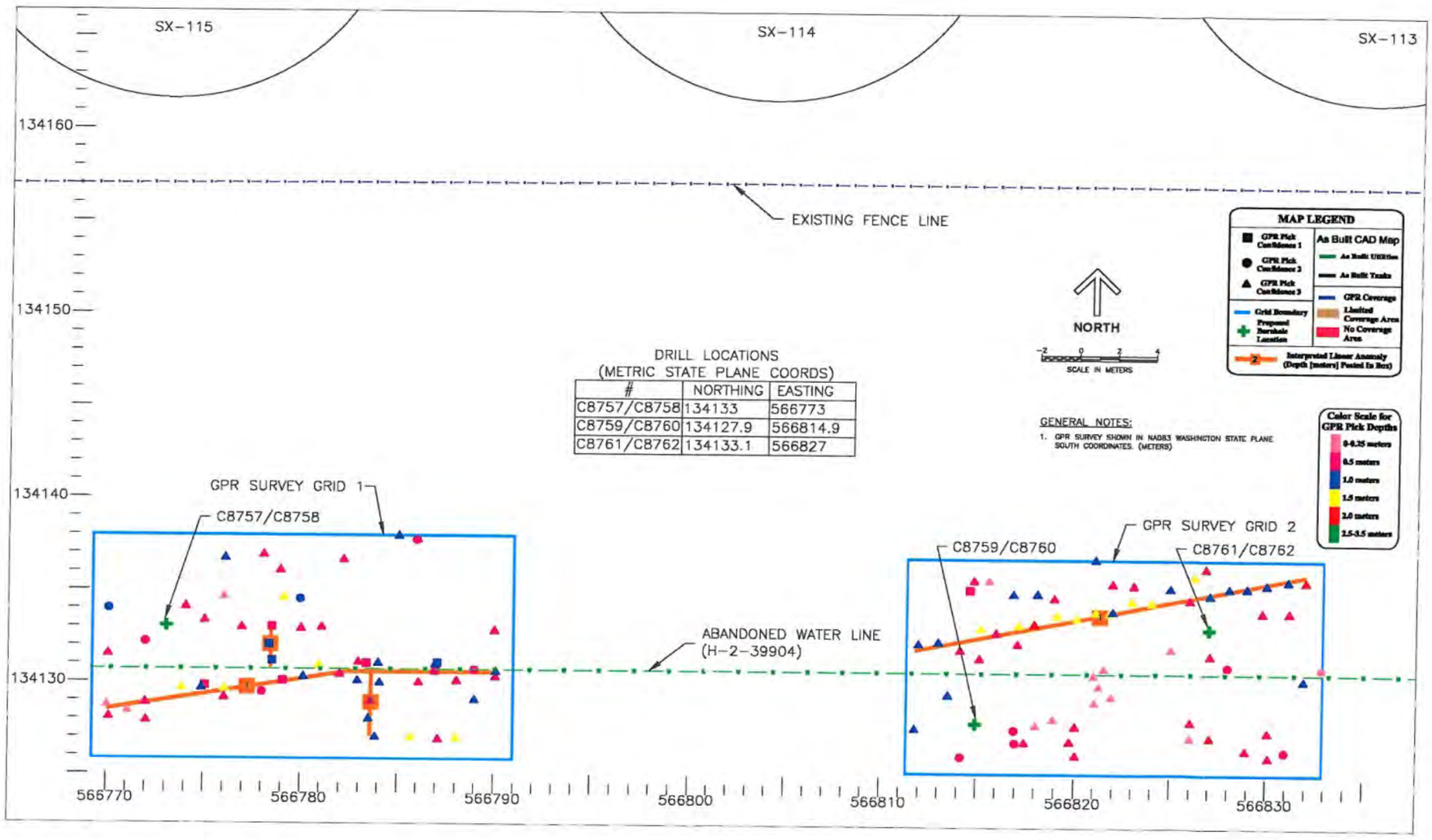
GG-NW-DOW-001
Rev. 0

Figure 2-1. Location Map of Waste Management Area S-SX and Surrounding Facilities in the 200 West Area.



GG-NW-DOW-001
Rev. 0

Figure 2-2. Site Map.



2.4.1 Push Location Documentation

These locations were selected through an iterative process using GPR data and review of as-built infrastructure drawings. The infrastructure interferences were reviewed from available drawings and site walk downs and this data was utilized for review of the GPR data. Based on this iterative process, three proposed areas were identified with an alternate for push site locations.

The final coordinates of the selected site were then plotted with computer-aided drafting. The push locations are documented above (see Table 2-1). In addition to the coordinate position of each push location, the push depth, geophysical log data, and other pertinent information derived during the activity (e.g., depth of contamination as identified from geophysical log interpretation and degree of contamination observed on push rods during extraction) is included in the Field Activity Reports and State of Washington, Department of Ecology-required documentation.

2.4.2 Push Location Tables And Numbering

All exploratory and sampling push location activities are tracked and documented on Field Activity Reports by referencing the Well identification (Well ID) number as provided in Table 2-1 or assigned during progress of the work. If sample collection is attempted, a unique Well ID number will be used to track the push location on the Field Activity Report, and the sample will be identified with that Well ID number on the sample label and the shipping documentation. The Well ID for a sample borehole is one number greater than the corresponding exploration borehole (e.g., if a zone of interest is identified at exploration Well ID C8757, the Well ID of the subsequent sampling push is C8758). The unique Well ID number for both the exploratory push and sampling push locations have been assigned and listed for use during the Stage I SX Pore Water Extraction Test by the Hanford Site Well Coordinator.

3.0 WORK TASKS

3.1 SITE SETUP

The push equipment will be mobilized and a controlled work area set up surrounding the preselected and marked location (see Figure 2-2 above). A radiological pre-survey of the tractor and equipment will be conducted (per WRPS procedure) prior to moving the equipment into the work zone. As noted above, GPR scans and as-built drawing reviews and comparisons have been completed to properly select the push location. The push equipment consists of a tractor-mounted mobile unit with a hydraulically-powered hammer and mast system. Support equipment to be used during field activities will be mobilized into the work area as needed. A forklift will transport needed support equipment to and from the push locations. Tank farm personnel will provide support, as necessary, for guiding the equipment onto location and for subsequent movement of the equipment to other locations.

WRPS Radiological Control Technicians and Nuclear Chemical Operators will be onsite to support work during activities that create potential personnel exposure. Contamination control

measures will consist of laying spill protection material beneath the equipment (when required). Spill protection consists of felt and plastic sheeting placed on and around the direct push unit when necessary and prudent. Control of the work area and control of potential contamination are aided by restricting site entries by unnecessary personnel. WRPS Health Physics personnel will provide direction and support to ensure radiological protection is maintained for all personnel associated with the work.

3.2 PRECAUTIONARY MEASURES

During advancement of the boreholes, casing (push rods) will be driven into the subsurface by use of the hydraulic hammer impact system. The push locations have been positioned to avoid impacting known/mapped structures. Careful observation of the push advance rates and resistance will be observed to preclude damage to any tank farm infrastructures should the as-built drawings be erroneous. If rod advance indicates that obstructions are present, push advance will stop, the direct push equipment and work area will be placed in a safe condition and the Closure and Corrective Measures Technical Lead or his designee, and the WRPS field work supervisor will be notified. If during push operations, a borehole is deemed to be "at refusal" as defined by trained operators of the direct push equipment (refusal is defined as a minimum of one inch of advance per minute of impact operations), the length of tubing driven will be noted in the Field Activity Report and the next sequential task as defined in Section 2.2 or 2.3 (depending on whether the borehole is an exploratory or a sampling borehole), will be performed.

All activities using the hammer unit will conform to the manufacturer's operating manual and applicable procedures and work package instructions that relate to the specific phase of work. As the push rods are extracted from the exploratory and sampling holes, the onsite Health Physics Technician will monitor for radiological contamination. WRPS tank farm-qualified Nuclear Chemical Operators will perform any decontamination required. The sealing requirements for decommissioning of the boreholes are defined in the appropriate sections of WAC 173-160.

3.3 GEOPHYSICAL LOGGING

At refusal or target total depth of the exploratory investigations, Energy*Solutions* will conduct logging operations to gather geophysical information. These geophysical investigations will be conducted in conformance with Energy*Solutions* procedure GG-NW-FA-PR-001, *Geophysical Logging* and the Energy*Solutions* document ESTP-QA-PN-001, *Engineered Systems and Technology Projects – Quality Assurance Program Plan.* Logging parameters may be changed and/or log suites may be added or deleted based on the technical needs of the project, as determined by the WRPS Closure and Corrective Measures Technical Lead. The following logging suites are planned.

1. Lanthanum Bromide/ Bismuth germanium oxide (LaBr/BGO) @ 100 seconds/0.5 ft
2. Additional logging with the "Red" and/or "Green" Geiger/Muller equipment, if necessary, based on observed results
3. Neutron-neutron detector with a client (WRPS)-provided Americium Beryllium source for moisture logging @ 15 seconds/0.25 ft
4. Infrared casing temperature detection (collected simultaneously to the LaBr /BGO detection).

Logging data will be collected from the surface to the total depth of the borehole. The logging analyst, Energy*Solutions* personnel, and the WRPS Closure and Corrective Measures Technical Lead will review the field log data. Based on the log data, up to two sampling intervals per site may be selected.

3.4 SAMPLING

After review of geophysical logging data and sampling zones have been selected, the push equipment will be relocated 2 to 3 ft away from the exploration borehole and sampling will be performed.

3.4.1 Sampling Process

The sampling process will entail a multiple sampling method as described in Section 2.3.

After retrieving the sampler to surface, the sampling system will be disassembled and the stainless steel liners will be removed for packaging and shipment to the designated laboratory. If opening of the retrieved sampler would result in more than the allowable dose rates per the Radiation Work Permit, the sampler will be placed in a transportation drum and opened under controlled conditions at the designated laboratory, or as directed by the Radiation Control organization.

3.4.2 Cleaning

Quality control requires that all materials (e.g., sample liners, material retaining baskets [finger baskets], sample caps) used for the performance of sampling activities be cleaned using U.S. Environmental Protection Agency guidelines/specifications as referenced in the RCRA. Cleaning of samplers, liners, etc., is the responsibility of the 222-S Laboratory personnel. WRPS Nuclear Chemical Operators will transport the clean sampling equipment to the job site. Equipment used for push advance purposes (e.g., push rods, tips) will be high-pressure washed using an approved non-phosphate cleaner. If it is not possible to remove the push equipment from the tank farm for cleaning, State of Washington, Department of Ecology has granted a variance to allow for hand cleaning and wiping of the rods to meet WAC cleaning requirements. The push equipment will be visibly free of dirt, grease, and other possible contamination which would potentially provide for cross-contamination of retrieved samples. After being cleaned, the equipment will be protected from contamination from surface chemicals and push operation-related chemicals. This protection will be accomplished by covering the materials with plastic or

other acceptable materials, if necessary. The cleaned and protected equipment will be tracked by use of cleaning certification documentation.

3.4.3 Rinsate Samples

Field equipment rinsate blanks may be required for analysis purposes. This determination and collection of these rinsate samples is the responsibility of WRPS and their designated personnel.

3.5 FALLING HEAD TESTING AND BOREHOLE WALL MANIPULATION

There are up to six zones available for testing and up to four of these are currently planned for testing. All measurements, lengths of pipe placed, volumes of fluid added, and actions taken will be recorded on the daily Field Activity Report.

3.5.1 Falling Head Test

A desk instruction for the falling head activities shall be prepared to guide field actions. The falling head tests will be conducted by placement of an approximately 2 ft long screen section with a 6 in. to 1 ft long sump out through the end of the push tubing and will be centered within the zone of investigation. The screen and sump will be connected to surface by the PVC riser pipe. After placement of the screen and pipe, a piezometer will be positioned in the sump and connected to a computer at the surface. Up to 5 gallons of potable water will be introduced into the borehole and allowed to infiltrate into the borehole wall and formation while plotting the rate of decline of the height of water in the riser pipe (e.g., falling head). The onsite hydrologist will observe the data plots and provide direction regarding length of time for data collection, whether or not to repeat the test, and actions to be taken at the conclusion of the individual tests.

Graphs generated by plotting the head height vs. time will be utilized to calculate the borehole wall permeability. This data will be used to determine the net effect of the direct push methodology on formation permeability. Following the determination of effective permeability, (K), the borehole will be surged in an attempt to breakdown the compaction zone along the borehole wall.

3.5.2 Borehole Wall Manipulation (Surging)

When the onsite hydrogeologist has decided that the time vs. head height has reached "steady state" (i.e., the rate of change in the plotted curve is less than one), then the test will be terminated and the piezometer will be removed from the well. If necessary, additional water will be added to the well in order to assure that the zone of interest (screen interval) has a sufficient fluid height to cover the screen. The volume of water added to the well, will be recorded on the Field Activity Report. A slug rod will be inserted into the screen for surging the well. The screen zone will be surged by the up and down movement of the slug rod for up to 15 minutes and a measurement to determine the water level in the well will be performed. The onsite hydrogeologist will determine if additional water and surging is warranted, or if an additional falling head test should be conducted. These iterative steps of falling head testing and surging

will be repeated until comparison of the generated test graphics indicate that the borehole wall permeability has been affected, or if no other additional actions are justified.

3.6 EXPLORATION AND SAMPLING BOREHOLE DECOMMISSIONING

Applicable requirements contained in WAC 173-160 will be used to control and guide actions for decommissioning the sampling and exploratory borehole. Each exploratory borehole and sampling hole will be filled with bentonite, a bentonite slurry, and/or grout (neat cement or cement-bentonite mixture) during the push rod extraction process. At the direction of the WRPS Closure and Corrective Measures Technical Lead, subsurface resistivity probes may be placed in the exploratory boreholes. Placement of the resistivity instrumentation and decommissioning materials used will be documented on the daily Field Activity Report and WAC Well Report.

4.0 ENVIRONMENTAL, SAFETY, AND HEALTH PROGRAM

The primary concern for Energy*Solutions* and the client (WRPS) is the safety of personnel assigned to perform activities related to the SX Pore Water Extraction Stage I work. These issues are addressed and all Energy*Solutions*, WRPS, and applicable *Occupational Safety and Health Act of 1970* safety and health requirements are applied and adhered to during the field operations. An activity-specific job hazard analysis outlines the specific activity hazards and the mitigation methodologies. The documentation governing the operation of the direct push rig, sampling, and decommissioning activities (JHA-GG-NWOP-RO-1858, Hanford SX Tank Farm Pore Water Extraction Stage I) is included as a portion of the WRPS tank farm work package.

Both Energy*Solutions* Safety personnel and WRPS Tank Farm Industrial Hygiene and Safety personnel will survey the job site for safety and health compliance. Energy*Solutions* personnel and safety representatives will provide onsite inspections and visits during drilling, sampling, and decommissioning/construction activities to ensure compliance with the Job Hazard Analysis. Routine inspection reports will be provided to the WRPS Closure and Corrective Measures Technical Lead.

Energy*Solutions* subscribes to the Integrated Safety Management System and has implemented an Integrated Safety Management System approach into all of its work tasks. These requirements flow down, not only internally to Energy*Solutions* employees but also to Energy*Solutions* subcontractors. All of the following requirements are in effect and will be observed, enforced and followed.

- Safety rules and procedures for safe job performance.
- Radiological Work Permit.
- WAC 173-160, as amended.
- *Occupational Safety and Health Act of 1970.*
- Client-identified standards.

These requirements are communicated to everyone associated with the project (visitors included) using the WRPS Job Hazards Analysis checklist prepared by Energy*Solutions* Safety personnel. This Job Hazards Analysis checklist meets the Energy*Solutions* Environmental, Safety, and Health (ES&H) Program requirements. This program encompasses environment, safety, and health, including pollution prevention and waste minimization. All work for this project will be conducted in accordance with the five core functions of the Energy*Solutions* Integrated Safety Management System. These core functions are:

- Define the scope of work
- Identify the work hazards and ES&H requirements
- Analyze the work hazards and implement controls
- Perform the work activity within the developed controls
- Provide feedback on the adequacy of controls and safety management improvement.

The specific procedures used to accomplish these core functions are found in the Energy*Solutions* ES&H Program.

4.1 ENVIRONMENTAL, SAFETY, AND HEALTH PROGRAM KEY ELEMENTS

- Line management is responsible for the protection of employees, the public, and the environment.
- Clear and unambiguous lines of authority and responsibility for ensuring ES&H are established and maintained at all organizational levels.
- Personnel have "stop work" authority.
- Personnel possess the experience, knowledge, skills and abilities that are necessary to discharge their responsibilities.
- Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.
- Before work is performed, the associated hazards are evaluated and an agreed-upon set of ES&H standards and requirements is established which, if properly implemented, provides adequate assurance that employees, the public and the environment are protected from adverse consequences.
- Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards. Emphasis should be on designing the work and/or controls to reduce or eliminate the hazards and to prevent accidents, unplanned releases, and exposures.

4.2 WRPS-REQUIRED ENVIRONMENTAL, SAFETY, AND HEALTH ELEMENTS

WRPS has provided a comprehensive list of WRPS, DOE, and Hanford Site-specific procedures and requirements for conducting work within the confines of the S-SX WMA. While executing the work scope detailed in this DOW, Energy*Solutions* will comply with all applicable directives and orders resulting from WRPS requirements.

5.0 QUALITY ASSURANCE

All work performed for the WRPS shall be based on the requirements of:

- Title 10 of the Code of Federal Regulations, Part 830, Subpart A (10 CFR 830, Subpart A), *Quality Assurance Requirements.*
- DOE Order 414.1C, *Quality Assurance*, for facilities and projects with the scope of work.
- NQA-1-2004, *Quality Requirements for Nuclear Facility Applications.*

Energy*Solutions* will conduct work in accordance with the Energy*Solutions* Quality Assurance Program, to specific work procedures and to this work plan.

6.0 REFERENCES

DOE Order 5700.6C, 1991, *Quality Assurance*, U.S. Department of Energy, Washington, D.C.

ESTP-QA-PN-001, 2012, Engineered Systems and Technology Projects – Quality Assurance Program Plan, Rev. 6, Energy*Solutions* Federal Services, Western Operations, Richland, Washington.

GG-NW-FA-PR-001, *Geophysical Logging,* Energy*Solutions* Government Group, Northwest Operation, Richland, Washington.

HNF-4936, 1999, *Subsurface Physical Conditions Description of the S-SX Waste Management Area*, Rev. 0, Lockheed Martin Hanford Company, Richland, Washington.

JHA-GG-NWOP-RO-1858, 2012, Hanford SX Tank Farm Pore Water Extraction Stage I, Rev. 0, Energy*Solutions* Technical Services, Richland, Washington.

Occupational Safety and Health Act of 1970, 29 USC 651 et seq.

Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq.

RPP-7884, 2002, *Field Investigation Report for Waste Management Area S-SX*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-23748, 2006, *Geology, Hydrogeology, Geochemistry, and Mineralogy Data Package for the Single-Shell Tank Waste Management Areas at the Hanford Site*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-PLAN-53808, 2012, *200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan.* Washington River Protection Solutions, LLC, Richland, Washington.

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells," *Washington Administrative Code*, as amended.

This page intentionally left blank.

APPENDIX B

DESCRIPTION OF WORK
SX POREWATER EXTRACTION – STAGE III

This page intentionally left blank.

ENERGYSOLUTIONS PL-36472-OP-0002

Description of Work: SX Pore Water Extraction – Stage III

Revision 0

Authored By: P. C. Berlin, Scientist — Date: 5/29/13

Reviewed By: K. D. Reynolds, Senior Scientist — Date: 5-29-13

Approved By: M. G. Gardner, Manager, Washington Operations — Date: 5-29-13

Approved By: For K.D. Hutchings per telecon — K. D. Hutchings, Safety — Date: 5-30-13

- [X] New
- [ ] Title Change
- [ ] Revision
- [ ] Rewrite
- [ ] Cancellation

Effective Date _____

PL-36472-OP-0002
Rev. 0

DESCRIPTION OF WORK: SX PORE WATER EXTRACTION STAGE III

May 2013

Prepared for
Washington River Protection Solutions, LLC

by
Technical Services
Energy*Solutions* Government Group, Inc., Washington Operations

CONTENTS

FIGURES

TABLES

TERMS

bgs	below ground surface
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
DOW	description of work
Energy*Solutions*	Energy*Solutions* Government Group, Inc., Northwest Operations
ES&H	Environmental, Safety, and Health
GHA	general hazard analysis
GPR	ground penetrating radar
ID	inside diameter
ISMS	Integrated Safety Management System
OD	outside diameter
RCRA	*Resource Conservation and Recovery Act of 1976*
RPP	River Protection Project
SJHA	Standing Job Hazard Analysis
SST	single-shell tank
WAC	*Washington Administrative Code*
Well ID	Well identification
WMA	Waste Management Area
WRPS	Washington River Protection Solutions, LLC

PL-36472-OP-0002
Rev. 0

DESCRIPTION OF WORK: SX PORE WATER EXTRACTION STAGE III

1.0 INTRODUCTION AND BACKGROUND

1.1 GENERAL DESCRIPTION

There are 177 large, underground tanks located at the Hanford Site, 149 of them are single-shelled. These tanks and their associated facilities are grouped into 12 "tank farms." The tanks were used for storage of some of the most dangerous and hazardous waste produced during the processing of irradiated fuel to obtain plutonium. Tank farms were located downhill from chemical separations plants so that the wastes would gravity-flow to the tanks. Six single-shell tank (SST) farms (241-S, 241-SX, 241-T, 241-TX, 241-TY, and 241-U) are located in the 200 West Area of the Hanford Site. This Description of Work (DOW) focuses on the SX tank farm and an investigation related to extraction of potentially contaminated pore-water from under and adjacent to the SX tank farm. This DOW provides the work instructions for conducting characterization, logging, oversight, and documentation efforts for continuing activities related to SX Pore Water Extraction as listed in RPP-PLAN-53808, *200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan*, Rev. 1 or latest revision. The scope of work includes: providing equipment and personnel to conduct direct push activities; providing safety oversight; providing geophysical logging services; procuring and installing packer and screen assemblies; performing falling head tests and borehole wall manipulation activities in screened areas of the boreholes; attending meetings and planning sessions; and providing a written report documenting field activities and data collection at the conclusion of the scope of work. This work is being conducted at the direction of Washington River Protection Solutions (WRPS) Closure and Corrective Measures group.

1.2 BACKGROUND

The U.S. Department of Energy (DOE) assigned the River Protection Project (RPP) Single-Shell Tank Program the tasks of transferring waste from the SST to double-shell tanks, and developing and implementing a strategy to retrieve SST waste and miscellaneous underground storage tank waste. The WRPS Closure and Corrective Measures group was given responsibility for collecting and providing subsurface data from the SST farm facilities. This contributes to preparation for the eventual retrieval of the tank waste. The intent of the SST Waste Management Area (WMA) characterization program is to collect and analyze samples to provide an understanding of the distribution and movement of contaminants in the vadose zone under and adjacent to the tank farms. These SST farms are designated as Radiological Buffer Areas or Contamination Areas.

The SX tank farm is believed to have been associated with tank waste losses to the soil column as a result of overfilling, leaks from ancillary equipment, and/or leaks from the tanks themselves.

Detailed estimates of soil waste inventories have been prepared for this tank farm and are documented in various reports identified in RPP-PLAN-53808.

The purpose of the Pore Water Extraction testing is to determine if the technology has potential to remediate identified contamination. Stage I initial actions characterized the study area, provided for selection of a test site, and gathered location-specific technical information of the lithology for performing a proof-of-principle extraction test.

Results of previous soil investigations at SX tank farm have documented the presence of nitrate and technetium-99 contamination within the vadose zone. The most effective way to mitigate risk associated with this contamination is through restriction of groundwater recharge using interim surface barriers or removing contaminants in the vadose. RPP-7884, *Field Investigation Report for Waste Management Area S-SX*, indicates future risk is best mitigated by reducing both the subsurface moisture content and the soil contaminant inventory. Previous work completed at T and TY tank farms resulted in the installation of interim surface barriers to reduce soil moisture. The work planned in this document evaluates the potential to reduce the subsurface soil moisture and contaminant inventory through pore water and vapor extraction.

Recent logging and sampling performed under GG-NW-DOW-001, *Description of Work: SX Pore Water Extraction - Stage I* (also includes Stage II), determined that sampled zones in the Cold Creek had sediment types that met Pacific Northwest National Laboratory modeling criteria for suitability for pore water extraction, the targeted sediments were of sufficient thickness to be viable candidates for extraction, and sampling results contained detectable levels of nitrates that would prove/demonstrate the viability/success of the technology at this location.

1.3 TANK FARM BACKGROUND

The SX tank farm was constructed between 1953 and 1954 and consists of 15 SSTs. The 241-SX tanks are arranged in rows of three tanks each, downhill from the chemical separations plants, each tank at a slightly lower elevation than its neighbor so that the wastes gravity-flow into the tanks. Each of the 241-SX tanks has a nominal one million gallon storage capacity, and consists of a carbon steel liner inside a reinforced concrete shell. The steel tank liner covers the 75-ft inner diameter tank bottom and sidewalls to a height of approximately 32 ft as measured from the tank center. The tank bottom is dish-shaped and slopes approximately 3.3% from the sidewall to the tank center (i.e., 14.875-in. elevation drop over 37.5-ft radius).

Ten of the tanks in the SX tank farm have laterals (cased borings) installed below the tank bottoms as part of the leak detection system. In addition to laterals, vadose zone monitoring wells (drywells) are installed throughout the tank farm for leak detection.

1.4 PHYSICAL SETTING

The SST tank farms were constructed in excavations into the near-surface sediments that overlie the Columbia River Basalt Group. The Columbia River Basalt forms the basement bedrock. There are approximately 169 to 179 m (555 to 590 ft) of continental sediments that overlie the basalt in WMA S-SX. From oldest to youngest, these deposits include the following.

- Columbia River Basalt Group
- Ringold Formation
- Cold Creek unit – lower carbonate rich sequence (CCU_l)
- Cold Creek unit – upper silt and sand sequence (CCU_u)
- Hanford Formation – lower fine sand and silt sequence (H2 subunit)
- Hanford Formation – middle coarse sand and gravel sequence, upper fine sand, and top gravelly sand sequence (H1 subunit)
- Backfill

The general characteristics of these units are described in more detail in RPP-23748, *Geology, Hydrogeology, Geochemistry, and Mineralogy Data Package for the Single-Shell Tank Waste Management Areas at the Hanford Site*. All of the formations, except for the surface of the Hanford formation, have a general tendency to dip west to southwest toward the axis of the Cold Creek unit. The SSTs at WMA S-SX were placed within the Hanford formation sediments of an upper sand-dominated (H1) subunit, and may locally intercept the upper portions of a middle gravel-dominated Hanford (H1) unit. The vadose zone beneath WMA S-SX is as much as 65 m thick (213 ft) and consists of the Hanford formation, the Cold Creek unit, and the upper part of the Ringold Formation. Both the water table and the unconfined aquifer reside entirely within the Ringold Formation.

Sediments in the vadose zone vary from open-framework gravels of the gravel-dominated facies and interbedded sand and silt of the silt-dominated facies of the Hanford formation to calcium carbonate-rich deposits of the Cold Creek unit and cemented gravels of the Ringold Formation. These sediments are characterized by numerous lateral discontinuities, such as pinch outs, erosional truncations, and irregular flow patterns. If clastic dikes are present, they may enhance vertical flow patterns. Therefore, there are numerous possible avenues for contamination to migrate through the vadose zone (HNF-4936, *Subsurface Physical Conditions Description of the S-SX Waste Management Area*).

2.0 WORK SCOPE

Energy*Solutions* Government Group, Northwest Operations (Energy*Solutions*) will utilize a direct push technology to place testing pushes at four sites south of the 241-SX tank farm. At these sites, the testing boreholes will be driven to approximately 150 ft below ground surface (bgs). Volume reduction will be performed in three back to back actions in each of the four boreholes through the anticipated zone of interest. The boreholes will be utilized for collection of remote sensing geophysical log data. Gamma information and volumetric water

content will be collected with standard logging suites. These logging suites consist of a combination tool of lanthanum bromide and bismuth germinate oxide (LaBr/BGO) for gross gamma and spectral gamma analysis, and a neutron-neutron detector.

After log data collection and processing, the data will be reviewed to:

- Determine if the sediment type and bedding thickness are sufficient to meet extraction goals
- Identify the borehole to be used for extraction and the three boreholes to be used for monitoring boreholes
- Identify the precise depth for placement of the screen and packer assemblies.

WRPS Project Management and technical representatives and various subcontractors supporting the project will participate in performance of the above determinations.

After logging is complete, a well screen and packer assembly will be placed in the zone of interest in each well. Testing and well development will be performed. Section 3.5 contains a detailed description of the planned actions.

After the testing and well development activities have been completed, surface seals and connections to the surface extraction system will be installed. Section 3.0 provides more details on the screen and packer assemblies and information on the falling head tests, and borehole wall/formation development.

2.1 METHOD FOR BOREHOLE PLACEMENT

The method selected for borehole placement is a hydraulic hammer-driven push system on a tractor or track mounted-type carrier. The locations for investigation have been selected based on their relationship/proximity to C8761. The arrangement of the four boreholes in a 4 x 8 ft "box" is based on a multi-use intention that will allow any of the four locations to be utilized as an extraction well or monitoring well. Geophysical logging information will be used to determine which location will be used for monitoring or extraction.

The boreholes will be pushed using outer push tubing that is 6.67 cm (2.625-in.) OD x 4.76 cm (1.875-in.) ID and inner tubing that is 3.81 cm (1.5-in.) OD x 2.54 cm (1.0-in.) ID. This push method was chosen to reduce the compaction of the borehole wall during the driving process. Additional efforts to reduce the volume of materials compacted into the borehole wall, as the tip advances, will be accomplished by use of the dual wall sampling system to remove soil volume from the center of the borehole as the tubing is advanced through the area of interest. Three volume reduction runs (each of about 24 in. in length) will be conducted (back to back) from 124 to 130 ft bgs, using the standard device for sampling. The recovered material will not be analyzed and will be disposed of in an onsite waste barrel.

The dual wall sampling system holds three stainless steel liners that are 3.17 cm (1.25-in.) OD x 2.7 cm (1.08-in.) ID. After the sampling system is advanced approximately 0.6 m (2 ft), the inner

string is released and retrieved to surface. The liners will be removed from the sampling system, surveyed, and placed into a disposal container.

After the volume reduction runs, the dummy tip will be re-inserted and the tubing will be driven to a total depth of approximately 150 ft bgs or refusal (whichever occurs first). Geophysical logging with LaBr/BGO gamma and neutron-neutron moisture instrumentation will be conducted. Data from the moisture and gamma logs collected from the borehole will be used by the WRPS Closure and Corrective Measures and Energy*Solutions* technical personnel to determine the precise location for the placement of the extraction assemblies.

2.2 PLACEMENT OF BOREHOLES

The general location for the four prospective test locations, in relation to 200 West Area and the Hanford Site, is shown in Figure 2-1. Ground penetrating radar (GPR) and electrical ground scans will be performed before boreholes are pushed to identify subsurface infrastructure and support citing of the test boreholes. The combination of subsurface infrastructure and surface accessibility will be used to determine the exact location of each borehole. The push location will be staked by use of Global Positioning Satellite equipment and verified by a licensed land surveyor.

Table 2-1 contains the proposed coordinates and borehole numbers associated with each borehole location. Figure 2-2 shows a close-up location of the boreholes showing the southern fence line of SX tank farm.

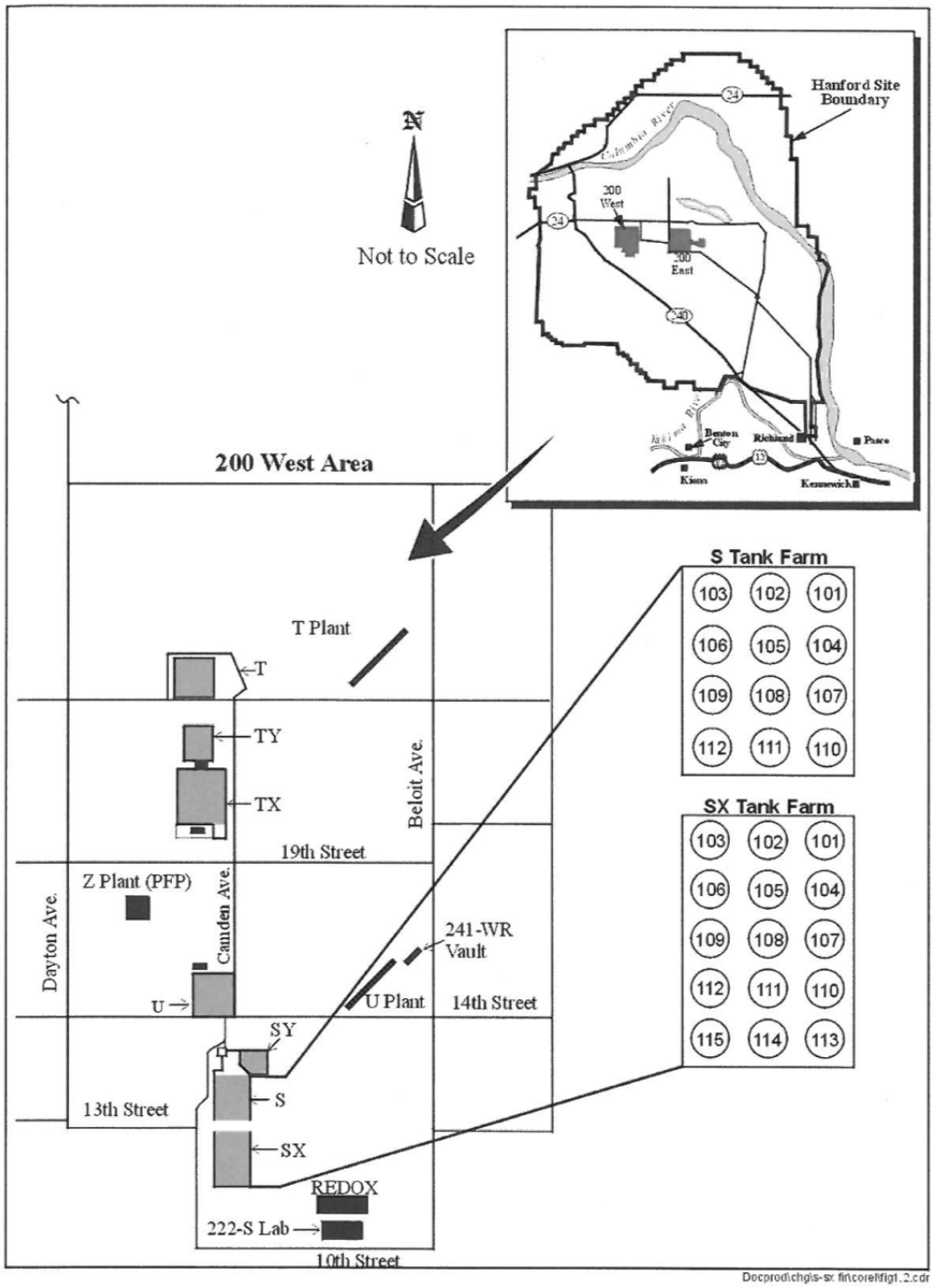
Table 2-1. Coordinates of Boreholes for Stage III.

Site #	Borehole #	Northing	Easting
1	C8823	134133.3	566824.1
2	C8824	134133.2	566825.3
3	C8825	134130.8	566825.1
4	C8826	134130. 8	566823.9

2.2.1 Push Location Documentation

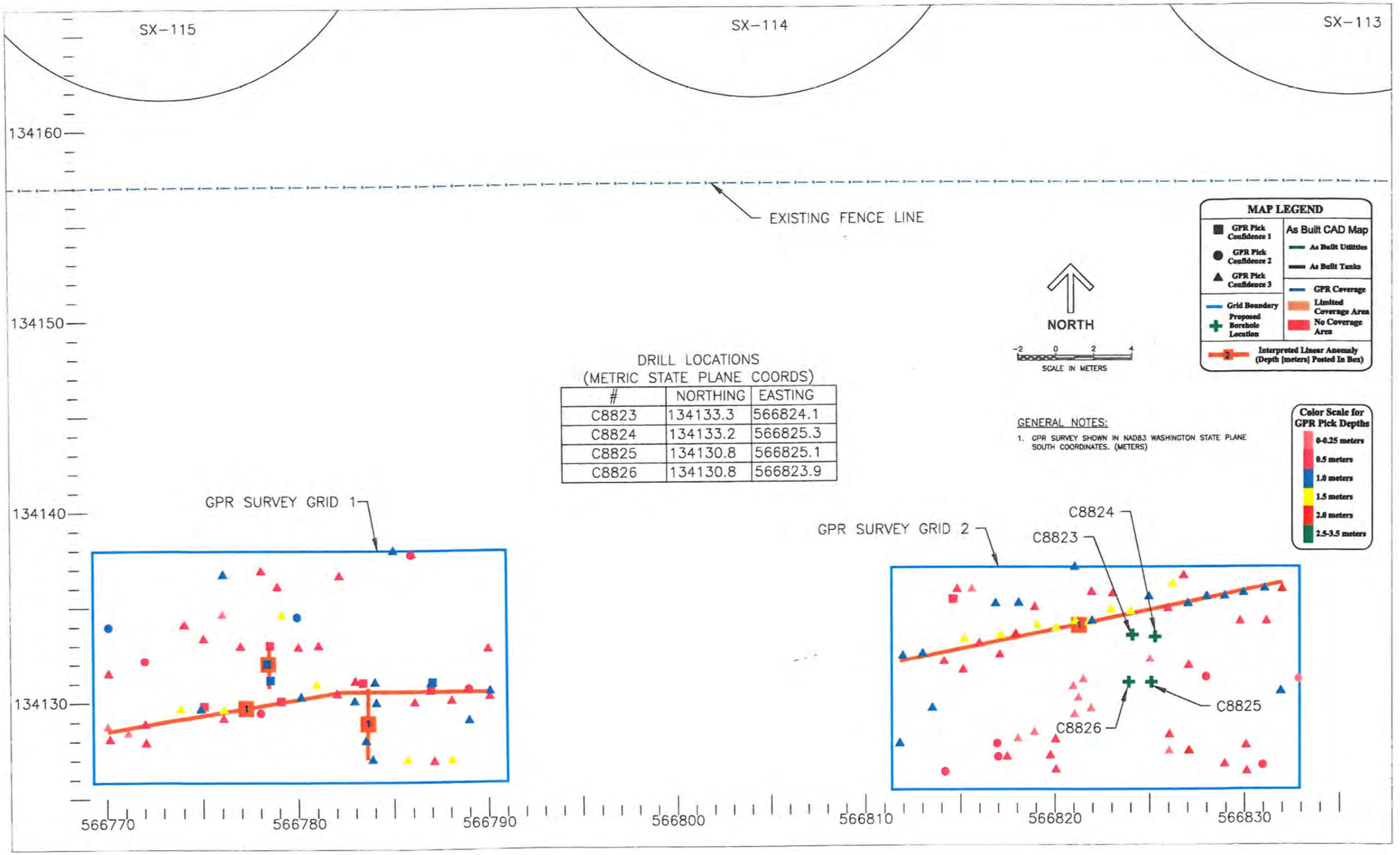
These locations were selected through an iterative process using GPR data and review of as-built infrastructure drawings. The infrastructure interferences were reviewed from available drawings and site walk downs and this data was utilized for review of the GPR data. Based on this iterative process, four proposed push site locations were identified.

Figure 2-1. Location Map of Waste Management Area S-SX and Surrounding Facilities in the 200 West Area.



PL-36472-OP-0002
Rev. 0

Figure 2-2. Site Map.



#	NORTHING	EASTING
C8823	134133.3	566824.1
C8824	134133.2	566825.3
C8825	134130.8	566825.1
C8826	134130.8	566823.9

The final coordinates of the selected sites were then plotted with computer-aided drafting. The push locations are documented above (see Table 2-1). In addition to the coordinate position of each push location, the push depth, geophysical log data, and other pertinent information derived during the activity (e.g., depth of contamination as identified from geophysical log interpretation and degree of contamination observed on push rods during extraction) is included in the Field Activity Reports and State of Washington, Department of Ecology-required documentation.

2.2.2 Push Location Tables And Numbering

All push location activities are tracked and documented on Field Activity Reports by referencing the Well identification (Well ID) number as provided in Table 2-1 or assigned during progress of the work. The unique Well ID numbers for push locations have been assigned and listed for use during the Stage III SX Pore Water Extraction Test by the Hanford Site Well Coordinator.

3.0 WORK TASKS

3.1 SITE SETUP

The push equipment will be mobilized and a controlled work area set up surrounding the preselected and marked location. A radiological pre-survey of the tractor and equipment will be conducted (per WRPS procedure) prior to moving the equipment into the work zone. As noted above, GPR scans and as-built drawing reviews and comparisons have been completed to properly select the push location. The push equipment consists of a tractor-mounted mobile unit with a hydraulically-powered hammer and mast system. Support equipment to be used during field activities will be mobilized into the work area as needed. A forklift will transport needed support equipment to and from the push locations. Tank farm personnel will provide support, as necessary, for guiding the equipment onto location and for subsequent movement of the equipment to other locations.

WRPS Radiological Control Technicians and Nuclear Chemical Operators will be onsite to support work during activities that create potential personnel exposure. Contamination control measures will consist of laying spill protection material beneath the equipment (when required). Spill protection consists of felt and plastic sheeting placed on and around the direct push unit when necessary and prudent. Control of the work area and control of potential contamination are aided by restricting site entries by unnecessary personnel. WRPS Health Physics personnel will provide direction and support to ensure radiological protection is maintained for all personnel associated with the work.

3.2 PRECAUTIONARY MEASURES

During advancement of the boreholes, casing (push rods) will be driven into the subsurface by use of the hydraulic hammer impact system. The push locations have been positioned to avoid impacting known/mapped structures. Careful observation of the push advance rates and

resistance will be observed to preclude damage to any tank farm infrastructures should the as-built drawings be erroneous. If rod advance indicates that obstructions are present, push advance will stop, the direct push equipment and work area will be placed in a safe condition and the Closure and Corrective Measures Technical Lead or his designee, and the WRPS field work supervisor will be notified. If during push operations, a borehole is deemed to be "at refusal" as defined by trained operators of the direct push equipment (refusal is defined as a minimum of one inch of advance per minute of impact operations), the length of tubing driven will be noted in the Field Activity Report and a decision made by the Closure and Corrective Measures Technical Lead, or his designee, as to whether the borehole is deep enough for falling head testing or if it must be decommissioned.

All activities using the hammer unit will conform to the manufacturer's operating manual and applicable procedures and work package instructions that relate to the specific phase of work. As the push rods are extracted from the boreholes, the onsite Health Physics Technician will monitor for radiological contamination. WRPS tank farm-qualified Nuclear Chemical Operators will perform any decontamination required. The sealing requirements for decommissioning of the boreholes are defined in the appropriate sections of the Washington Administrative Code (WAC) 173-160.

3.3 GEOPHYSICAL LOGGING

Energy*Solutions* will conduct logging operations to gather geophysical information. These geophysical investigations will be conducted in conformance with Energy*Solutions* procedure GG-NW-FA-PR-001, *Geophysical Logging* and the Energy*Solutions* document ESTP-QA-PN-001, *Engineered Systems and Technology Projects – Quality Assurance Program Plan.* Logging parameters may be changed and/or log suites may be added or deleted based on the technical needs of the project, as determined by the WRPS Closure and Corrective Measures Technical Lead. The following logging suites are planned:

1. Lanthanum Bromide/Bismuth germinate oxide (LaBr/BGO) @ 100 seconds/0.5 ft
2. Additional logging with the "Red" and/or "Green" Geiger/Muller equipment, if necessary, based on observed results
3. Neutron-Neutron detector with a client (WRPS)-provided Americium Beryllium source for moisture logging @ 15 seconds/0.25 ft

Logging data will be collected from 150 ft to 90 ft bgs in each borehole. The logging analyst, Energy*Solutions* personnel, and the WRPS Closure and Corrective Measures Technical Lead will review the log data and select the locations for the falling head tests.

3.4 MONITORING AND EXTRACTION WELL PLACEMENT

These extraction wells will be initially driven utilizing the 2 5/8 in. OD dual wall tubing system. When the boring is advanced through the zone of interest, actions to reduce the amount of soil displaced into the side wall of the hole will be conducted. This will be accomplished by

advancing the soil sampling system through the interval. This material will not be analyzed and will be discarded into a waste barrel. This soil removal activity is intended to decrease the volume of material displaced into the borehole wall and increase the potential improvement in borehole wall permeability gained by the well development actions. After the well has advanced to the planned total depth of approximately 150 ft bgs, or met refusal, the entire casing/tubing string will be removed and replaced with a single use design with an expanded 2 5/8 in. open throat point holder with a disposable tip. This system will then be re-driven to refusal or the original total depth. This set of actions will be conducted in each of the four borings.

Each of the four borings will have a sump, and a well screen and packer assembly placed in the zone of interest, as determined from review of geophysical log data and correlation to the nearby characterization borehole (C8761). Figure 3-1 shows a depiction of a successful as-built condition for placing and cementing a packer and well screen assembly.

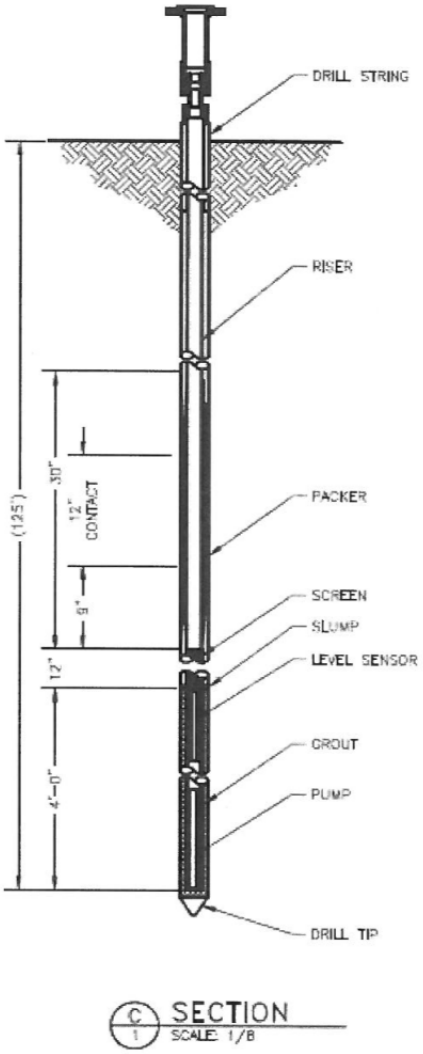
3.5 FALLING HEAD TESTING AND BOREHOLE WALL MANIPULATION

Four zones of interest (one in each borehole) will be developed after the screen and packer assemblies have been placed, cemented, and have undergone sufficient curing time to have reached a non-deformable state. The development is designed to breakdown the compaction zone created along the borehole wall by displacement of soil materials as the direct push probe is advanced. A desk instruction for falling head testing and borehole wall manipulation will direct the field activities. All measurements, lengths of pipe placed, volumes of fluid added, and actions taken will be recorded on the daily Field Activity Report.

The screen and packer assembly will be placed, cemented, and allowed to cure before additional activities are undertaken. The cure time for the cement will be determined by placing a sample of the cement mix in a container at surface. When the sample cement is observed to be non-deformable, a pressure transducer will be placed near the top of the well sump, and an initial falling head test will be conducted prior to attempting any borehole wall compaction zone modification. Up to two gallons of potable water will be introduced into the borehole and allowed to infiltrate into the borehole wall and formation while the rate of decline of the height of water in the riser pipe (e.g., falling head) is recorded on a surface computer. The field hydrologist will observe the data plots and direct the length of time for data collection. It is currently estimated that this test will require between four and eight hours to complete. Graphs generated by plotting the head height vs. time will be utilized to calculate the borehole wall permeability. This data will be used to determine the net effect of the direct push methodology on formation permeability.

PL-36472-OP-0002
Rev. 0

Figure 3-1. Packer and Screen Assembly.



Following the determination of effective permeability (K), the transducer will be removed, additional water will be added, and the borehole will be surged for a prescribed period of time. Debris produced during this surging will be removed, and additional water will be added as necessary to facilitate pumping and removal of the debris produced through the well screen in an attempt to breakdown the compaction zone along the borehole wall. After a number of repetitions (adding water, surging, and water and debris removal), the pressure transducer will be repositioned in the well and a second falling head test will be conducted. The estimate for this test is one hour in duration. The initial shape of the draw-down (head decline) curve will be sufficient to determine if the surging has created the desired effect and has sufficiently enhanced the borehole wall permeability to provide sufficient connection to the undisturbed formation for conducting extraction activities. The hydrology consultant will prepare comparative graphs for use in determining the relative success of the borehole wall development actions.

3.6 EXPLORATION AND SAMPLING BOREHOLE DECOMMISSIONING

At the conclusion of surging and testing activities, the surface treatment specified by the vacuum extraction equipment design contractor will be added to the riser and the well will be secured. The wells will be held in this condition for further testing and will not be decommissioned until directed by WRPS Project Management.

Applicable requirements contained in WAC 173-160 will be used to control and guide actions for drilling, construction, and subsequent decommissioning actions at the conclusion of water extraction testing. Given that these are not normal well placements, a variance to WAC 173-160 rules will be requested prior to the initiation of drilling. When directed by WRPS, each borehole will be filled with bentonite, a bentonite slurry, and/or grout (neat cement or cement-bentonite mixture) during the outer casing extraction process after filling the sump, screen, and inner riser pipe with bentonite. All decommissioning materials used, depth of placement, and other actions will be documented on the daily Field Activity Report and WAC Well Report.

4.0 ENVIRONMENTAL, SAFETY, AND HEALTH PROGRAM

The primary concern for Energy*Solutions* and the client (WRPS) is the safety of personnel assigned to perform activities related to the SX tank farm work. WRPS has provided a comprehensive list of WRPS, DOE, and Hanford Site-specific procedures and requirements for conducting work within the confines of the SX tank farm. While executing the work scope detailed in this DOW, Energy*Solutions* will comply with all applicable directives and orders resulting from WRPS requirements, DOE, and Hanford Site procedures.

4.1 ENERGY*SOLUTIONS* INTEGRATED SAFTEY MANAGEMENT SYSTEM KEY ELEMENTS

Energy*Solutions* subscribes to the Integrated Safety Management System (ISMS) and has implemented an ISMS approach into all of its work tasks. These requirements flow down, not only internally to Energy*Solutions* employees but also to Energy*Solutions* subcontractors. All of the following are in effect and will be observed, enforced and followed.

- WRPS safety and health standards, procedures, and permits.
- 10 CFR 851
- WAC 173-160, as amended.
- *Occupational Safety and Health Act of 1970.*
- Energy*Solutions* safety and health standards, procedures, and permits.

4.1.1 Integrated Safety Management System Core Functions

This ISMS program encompasses environment, safety, and health, including pollution prevention and waste minimization. All work for this project will be analyzed in accordance with the five core functions of the Energy*Solutions* ISMS:

- Define the scope of work.
- Identify the work hazards and Environmental, Safety, and Health (ES&H) requirements.
- Analyze the work hazards and implement controls.
- Perform the work activity within the developed controls.
- Provide feedback on the adequacy of controls and safety management improvement.

4.1.2 Integrated Safety Management System Key Elements

The ISMS guiding principles describe the environment or context for work activities in that most principles apply to each and every ISMS core function. The guiding principles are:

- Line management is responsible for the protection of employees, the public, and the environment.
- Clear and unambiguous lines of authority and responsibility for ensuring ES&H are established and maintained at all organizational levels.
- Personnel have "stop work" authority.
- Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.
- Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.
- Before work is performed, the associated hazards are evaluated and an agreed-upon set of ES&H standards and requirements is established which, if properly implemented, provides

adequate assurance that employees, the public, and the environment are protected from adverse consequences.

- Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards. Emphasis should be on designing the work and/or controls to reduce or eliminate the hazards and to prevent accidents, unplanned releases, and exposures.

4.2 JOB HAZARD ANALYSIS

WRPS has prepared a general hazard analysis (GHA) that applies to all personnel employed by WRPS or subcontracted to WRPS on the Hanford site. This hazard analysis identifies routine industrial safety hazards where employee training and knowledge are considered sufficient to implement skill-based controls.

In addition to the GHA, Energy*Solutions* has coordinated with WRPS Industrial Hygiene and Safety oversight to prepare a standing job hazard analysis (SJHA-0080) for Vadose Direct Push activities located inside/around WRPS tank farms; encompassing the hydraulic hammer unit direct push activities to be conducted during this scope of work. Energy*Solutions* personnel performing these activities have been provided the appropriate training and instruction to mitigate these hazards. The requirements of the WRPS GHA and SJHA are communicated to everyone associated with the project, including visitors.

4.3 SAFETY AND HEALTH COMPLIANCE OVERSIGHT

Both Energy*Solutions* Safety personnel and WRPS Tank Farm Industrial Hygiene and Safety personnel may survey the job site for safety and health compliance. Energy*Solutions* safety representatives, in coordination with WRPS Tank Farm Industrial Hygiene and Safety personnel, will provide onsite inspections and visits during the drilling, sampling, and decommissioning/construction activities to ensure compliance with health and safety regulations and WRPS health and safety procedures. Routine inspection reports will be provided to the WRPS Closure and Corrective Measures Technical Lead.

5.0 QUALITY ASSURANCE

All work performed for the WRPS shall be based on the requirements of:

- Title 10 of the Code of Federal Regulations, Part 830, Subpart A (10 CFR 830, Subpart A), *Quality Assurance Requirements.*
- DOE Order 414.1C, *Quality Assurance*, for facilities and projects with the scope of work.
- NQA-1-2004, *Quality Requirements for Nuclear Facility Applications*.

Energy*Solutions* will conduct work in accordance with the *Engineered Systems and Technology Projects – Quality Assurance Program Plan*, to specific work procedures, and to this work plan.

6.0 REFERENCES

DOE Order 5700.6C, 1991, *Quality Assurance*, U.S. Department of Energy, Washington, D.C.

ESTP-QA-PN-001, 2012, *Engineered Systems and Technology Projects – Quality Assurance Program Plan*, Rev. 6, Energy*Solutions* Government Group, Richland, Washington.

General Hazard Analysis, 2013, Washington River Protection Solutions, LLC, Richland, Washington.

GG-NW-FA-PR-001, Geophysical *Logging,* Energy*Solutions* Government Group, Northwest Operation, Richland, Washington.

HNF-4936, 1999, *Subsurface Physical Conditions Description of the S-SX Waste Management Area*, Rev. 0, Lockheed Martin Hanford Company, Richland, Washington.

Occupational Safety and Health Act of 1970, 29 USC 651 et seq.

Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq.

RPP-7884, 2002, *Field Investigation Report for Waste Management Area S-SX*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-23748, 2006, *Geology, Hydrogeology, Geochemistry, and Mineralogy Data Package for the Single-Shell Tank Waste Management Areas at the Hanford Site*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-PLAN-53808, 2013, *200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan.* Washington River Protection Solutions, LLC, Richland, Washington.

SJHA-0080, 2013, *Standing Job Hazard Analysis for Vadose Direct Push Activities*, Washington River Protection Solutions, LLC, Richland, Washington

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells," *Washington Administrative Code*, as amended.

This page intentionally left blank.

APPENDIX C

DRILLING AND SAMPLING DAILY WORK RECORDS (STAGES I AND II)

This page intentionally left blank.

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Mobilize CAT HHU #4 and support equipment to "SX" Tank Farm and stage.

DATE: 01-08-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 01

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1.
2.
3.
4.

N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 (HHU CAT #4) HHUXL#3

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

N/A

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.	N/A	
3.	N/A	

N/A

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Dress the Part.
0700	Head to Energy Northwest and get cat # 4 ready to load on truck
0750	Driver on site to pickup Cat. #4
0800	Load cat and secure
0830	Head to 200 west with Cat #4
0905	AT 200 west unload cat and secure on plastic at Job location
0935	Head to smurff building
0945	Head to shop at Energy Northwest
1005	AT Shop. load up equipment
1200	lunch
1230	Get fork lift setup for Loadout of equipment Tomorrow, load support trailer. STANDBY: waiting on teamsters To haul material to the Job site
1530	End shift
	NOTE: 1. moved Cat #4 to site
	2. Load equipment / Gather equipment
	3. waiting on teamsters 3 hrs.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Snook
HPT: Mincy
FWS: Franzen

WEATHER: 46 F, mostly cloudy with winds from the southwest at 15-20 mph

DOWNTIME:

3 HRS. - TEAMSTERS

DISCARDED ITEMS:

N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS

TITLE: *ES TECHNICAL PREPARER*

SIGNATURE: Lo O. Amos

REVIEWED BY: M. WALKUP

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: _____ **DATE:** 1-9-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Teamsters mobilize remaining support equipment to "SX" Tank Farm and stage.

DATE: 01-09-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 02

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: *Yes* *No*

HHU CAT #2 *HHU CAT #4* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # _____ *Tubing (* *) @* N/A *to* *ft bgs; S.U.*

Borehole # _____ *Tubing (* *) @* *to* *ft bgs S.U.*

Borehole # _____ *Tubing (* *) @* *to* *ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Windy Days.**
0815	Travel to ENW to meet teamsters.
0836	Teamsters onsite at ENW. Load remaining tooling at ENW.
0911	Teamsters transported tooling to "SX" Tank Farm.
0945	Onsite at "SX" Tank Farm. Tooling was unloaded and staged.
1000	Traveled to ENW. ESGG crew on standby for work package.
1100	Lunch.
1130	ESGG crew on standby for work package. Traveled to office. Completed paperwork and timecard.
1530	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Snook
HPT: Mincy
FWS: Franzen

WEATHER: 46 F, mostly cloudy with winds from the southwest at 20-25 mph, gusting to 35 mph.

DOWNTIME: 5 Hrs.---Standby for work package.

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: L. O. Amos

REVIEWED BY: M. Walkup

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: M. L. Walkup

DATE: 1-10-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Standby for work package to be released.

DATE: 01-10-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 03

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1
2. N/A
3.
4.

SITE/EQUIPMENT INSPECTION: *Yes No*

HHU CAT #2 (*HHU CAT #4*) *HHUXL#3*

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ N/A to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Safety Signs.**
0630	ESGG crew on standby for work package to be released.
1100	Lunch.
1130	ESGG crew on standby for work package to be released. Completed paperwork and timecard.
1530	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Snook
HPT: Mincy
FWS: Franzen

WEATHER: 37 F, mostly cloudy with winds from the west-southwest at 5-15 mph.

DOWNTIME: 9 Hrs.---Waiting for work package to be released.

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: LO Amos

REVIEWED BY: M. Weakley

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: M. Weakley DATE: 1-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Staking probe holes for "SX" Tank Farm and standby for work package to be released.		**DATE:** 01-11-13
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION:** DAN-13-0036 U-DIG # 12285707	**REPORT #:** 04

START CARD NO. SE47030	**DECOMMISSION NO.** AE20137	**RWP:** JHA-GG-NWOP-RO-1858
SAMPLING SUMMARY	**SITE/EQUIPMENT INSPECTION:** *Yes No*	*HHU CAT #2* (*HHU CAT #4*) *HHUXL#3*

Sample #'s Interval %

1
2. N/A
3.
4.

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.
Borehole # _____ Tubing ( ) @ to ft bgs S.U.
Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

N/A

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1. N/A	N/A	
2. N/A		
3. N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Housekeeping 1.**
0725	Travel to Smurf to meet with WRPS FWS and go to "SX" Tank Farm to meet surveyors. Probe hole locations were marked.
0945	Travel to ENW. ESGG crew on standby for work package to be released.
1100	Lunch.
1130	ESGG crew on standby for work package to be released. Traveled to office. Completed paperwork and timecard.
1430	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup* *NCO: Snook* *HPT: Mincy* *FWS: Franzen*	**WEATHER:** 33 F, partly cloudy with winds from the southwest at 5-10 mph. **DOWNTIME:** 9 Hrs.---Waiting for work package to be released.	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O AMOS	**REVIEWED BY:** M. WILLIAMS
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: L O Amos	**SIGNATURE:** _____ **DATE:** 1-14-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Possibly set-up on 1st 2.5" boring at "SX" Tank Farm and standby for work package to be released.

DATE: 01-14-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 05

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: *Yes* (*No*)

HHU CAT #2 (*HHU CAT #4*) *HHUXL#3*

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U. N/A

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Presentation by ESGG Safety Staff. Weekly Safety Topic on PPE.
0630	On standby, waiting for work package to be released
11:30	Lunch
12:00	Standby, for package.
15:30	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Snook
HPT: Mincy
FWS: Franzen

WEATHER: 34 F, partly cloudy with light and variable winds

DOWNTIME: ~~N/A~~ 9 hrs (waiting on Package)

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: LO Amos

REVIEWED BY: [illegible]

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: [illegible] DATE: 1-15-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Possibly set-up on 1st 2.5" boring at "SX" Tank Farm and standby for work package to be released.

DATE: 01-15-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 06

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1.	N/A	
2.		
3.		
4.		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CAT #2 (*HHU CAT #4*) *HHUXL#3*

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ N/A to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Housekeeping 2
0630	ESGG Safety Meeting. Topic's: Hardhats & Gloves Discussed Hardhat and harness life and services limits Discussed Glove selection for different Applications and Materials.
710	waiting for work ~~package~~ package to be completed
1130	lunch
1200	waiting on project package to be released
1530	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Snook
HPT: Mincy
FWS: Franzen

WEATHER: 30 F, partly cloudy and cold. Winds will be calm.

DOWNTIME:
9 hrs. waiting on package

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos

TITLE: *ES TECHNICAL PREPARER*

SIGNATURE: LO Amos

REVIEWED BY: M. Walkup

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: M. Walkup **DATE:** 1-15-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Training by Three Rivers Scientific and standby for work package to be released.

DATE: 01-16-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 07

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1
2. N/A
3.
4.

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CAT #2 (*HHU CAT #4*) *HHUXL#3*

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U. N/A

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. N/A		
2. N/A		
3. N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: ESGG Safety training on eye protection and foot protection/steel toed boots.
0630	Standby: waiting for signed off package.
1050	lunch
1120	waiting on package
1500	Do paper work, timesheets
1530	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Snook
HPT: Mincy
FWS: Franzen

WEATHER: 30 F, cloudy with areas of fog and freezing fog.

DOWNTIME:
9 hrs. Due to package

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos
TITLE: *ES TECHNICAL PREPARER*
SIGNATURE: Lo O. Amos

REVIEWED BY: [illegible]
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [illegible] **DATE:** 1-16-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Possible pre-job and begin pushing boring #C8757 | **DATE:** 01-17-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford | **EXCAVATION:** DAN-13-0036, U-DIG # 12285707 | **REPORT #:** 08

START CARD NO. SE47030 | **DECOMMISSION NO.** AE20137 | **RWP:** JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: *Yes* (*No*) | *HHU CAT #2* (*HHU CAT #4*) *HHUXL#3*

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U. N/A

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: ESGG Safety training on Ear Muffs/Ear Plugs and PPE in the Workplace Summary.**
0630	ESGG crew on standby for work package to be released.
1100	Lunch.
1130	ESGG crew on standby for work package to be released. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Snook
HPT: Mincy
FWS: Franzen

WEATHER: 33 F, hazy sun with areas of freezing fog. Winds will be light and variable.

DOWNTIME: 9 Hrs.---Waiting for work package to be released.

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O Amos

REVIEWED BY: [illegible]
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [illegible] **DATE:** 1-17-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Pre-job and begin pushing 2.5" boring #C8757		**DATE: 01-21-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 09**

START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO762 Rev.0 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY	**SITE/EQUIPMENT INSPECTION:** (Yes) No	*HHU CAT #2* (*HHU CAT #4*) *HHUXL#3*

Sample #'s Interval %

1.
2.
3. N/A
4.

BOREHOLE SUMMARY

Borehole # C8757 *Tubing* 0.5" *) @* 0.5 *to* N/A *ft bgs; S.U.* N/A

Borehole # N/A *Tubing ( ) @ to ft bgs S.U.*

Borehole # N/A *Tubing ( ) @ to ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1. N/A		
2. N/A		
3. N/A		

N/A

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Riders.**
0715	Travel to Smurf for pre-job.
0800	Pre-job at Smurf by R. Franzen WRPS FWS.
0905	Travel to "SX" Tank Farm.
0915	Onsite at "SX" Tank Farm. Inspect and warm equipment. No problems noted. Move CAT HHU #4 and set-up on boring #C8757.
1000	Standby for NCO's to move pipe and support equipment to boring #C8757 with forklift.
1045	NCO's onsite. Pipe and support equipment were moved to boring #C8757 and staged.
1130	Lunch.
1200	IH tech. onsite performing baseline noise survey on CAT HHU #4.
1215	Standby for 8-point criteria (LOTO) to be added to work package. Traveled to ENW and office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Walkup* *NCO: Snook, Villarreal* *HPT: Mincy, Cox* *FWS: Franzen*	**WEATHER: 30 F, hazy and cold with areas of freezing fog. Winds will be light and variable.** **DOWNTIME: ¾ Hr.---NCO's. 3 ¼ Hr. for 8-point criteria to be added.**	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos	**REVIEWED BY:** [illegible]
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: LO Amos	**SIGNATURE:** [illegible] **DATE:** 1-21-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: POD at Smurf and begin pushing 2.5" boring #C8757 | **DATE:** 01-22-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford | **EXCAVATION:** DAN-13-0036, U-DIG # 12285707 | **REPORT #:** 10

START CARD NO. SE47030 | **DECOMMISSION NO.** AE20137 | **RWP:** CO762 Rev.0 **JHA-**GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.		
3.	N/A	
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CAT #2* (*HHU CAT #4*) *HHUXL#3*

BOREHOLE SUMMARY

*Borehole #*C8757R *Tubing* (2.5") @ 11.5' *to* 3.5' *ft bgs; S.U.* 3.1'

*Borehole #*C8757 *Tubing* (2.5") @ GS *to* 11.5' *ft bgs S.U.* 6.6'

Borehole # N/A *Tubing* ( ) @ *to* *ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Nitrogen Safety.**
0717	Travel to SMURF for P.O.D.
0753	Onsite at SMURF. P.O.D. at SMURF by R. Franzen FWS WRPS. NOTE: No 8-Point Criteria Checklist is in the work package yet.
0815	"ACE" under RWP CO-762 at SMURF and travel to "SX" Tank Farm.
0830	Onsite at "SX" Tank Farm. Standby for NCO's and HPT's. Inspect and warm equipment. No problems noted.
0845	NCO's onsite. Set-up boundary around work site.
0905	Pushed boring #C8757 from GS to refusal at 11.5' BGS. Notified R. Franzen WRPS FWS.
0930	Standby for direction from WRPS.
1000	Directed by WRPS to decommission #C8757 and rename it #C8757A. HPT's and NCO's set-up RBA and RCA around tubing.
-----	Back-pulled 2-4' joints of 2.5" tubing. Unable to back-pull remaining tubing. Needed to change from 2.5" drive head to 2.5" back-
-----	pulling head. There is no 8-Point Criteria Checklist in the work package to allow us to make the change. RCA was left around the
-----	tubing and the site was secured.
1045	Standby for 8-Point Criteria Checklist to be added to the work package.
1115	Lunch.
1145	Standby for 8-Point Criteria Checklist to be added to the work package. NOTE: 8-Point Criteria Checklist was received at 1400 Hrs.
1415	No HPT's returned to "SX" Tank Farm and we are unable to complete decommissioning #C8757A. Traveled to office. Completed
-----	paperwork and timecard.
1530	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Snook, Bacon
HPT: Mincy, Cox
FWS: Franzen

WEATHER: 32 F, mostly cloudy and cold with areas of freezing fog. Winds will be light and variable.

DOWNTIME: ¼ Hr.---NCO's, ½ Hr.---direction from WRPS and 4 ¼ Hrs for the 8-Point Criteria Checklist.

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O AMOS
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O Amos

REVIEWED BY: M. Walkup
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 1-22-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Finish decommissioning boring #C8757A, move 3' North and begin pushing #C8757.		DATE: 01-23-13
LOCATION: "SX" Tank Farm 200 W. Area Hanford	EXCAVATION: DAN-13-0036 U-DIG # 12285707	REPORT #: 11

START CARD NO. SE47030	DECOMMISSION NO. AE20137	RWP: CO-762 Rev.0 JHA-GG-NWOP-RO-1858
SAMPLING SUMMARY	SITE/EQUIPMENT INSPECTION: (Yes) No	HHU CAT #2 (HHU CAT #4) HHUXL#3

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

BOREHOLE SUMMARY

Borehole #C8757A Tubing (3.5") @ 3.5 to GS ft bgs; S.U. N/A

Borehole #C8757 Tubing (3.5") @ GS to 11.5 ft bgs S.U. 3-1

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Lifting Heavy Bags.**
0715	Travel to MO563 in 200W for P.O.D.
0740	Onsite at MO563. Standby for HPT's.
0755	P.O.D. by R. Franzen, FWS WRPS.
0815	Placed stickers on CAT HHU #4 for LOTO.
0900	ESGG crew on standby for HPT's to complete pre-survey of CAT HHU #4.
1100	Lunch.
1130	ESGG crew on standby for HPT's to complete pre-survey of CAT HHU #4.
1200	Pre-survey of CAT HHU #4 has been completed. ESGG crew on standby for HPT's to go to lunch.
1300	HPT's onsite. Completed decommissioning of boring #C8757A from 3.5' BGS to GS.
1315	As directed by WRPS moved 3' North of boring #C8757A and began pushing boring #C8757 from GS to refusal at 11.5'BGS.
1330	WPRS FWS R. Franzen notified of refusal. ESGG crew on standby waiting for direction from WRPS. Secured site for end of shift.
1420	ESGG crew on standby for direction from WRPS. Traveled to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Walkup, Weakley* *NCO: Snook, Villarreal, Sharp* *HPT: Mincy, Clayton* *FWS: Franzen*	**WEATHER: 38 F, slight chance of rain or snow. Winds from the northwest at 10 mph.** **DOWNTIME: 45 minutes---HPT's, rig survey 2 ½ Hrs. and direction from WRPS 2 Hrs.**	**DISCARDED ITEMS:** 1---Expendable knock-out tip. 4---Rivets. 1---#50 sack of bentonite.

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos	**REVIEWED BY:** M. Walker
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: L O. Amos	**SIGNATURE:** M. Walker **DATE:** 1-23-13

10/06/09 Rev 1

ENERGY SOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 21

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Decommission #C8757, move 3' South of #C8757A and begin direct push activities.

DATE: 01-24-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 12

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.0 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 (HHU CAT #4) HHUXL#3

BOREHOLE SUMMARY

Borehole # C8757A Tubing (2.5) @ 11.5 to 0 ft bgs; S.U. N/A

Borehole # C8757 Tubing (2.5) @ 0 to 11.5 ft bgs S.U. 3

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Driver Conduct at Accident Scene.**
0715	Travel to MO563 in 200W for P.O.D.
0745	On site waiting for POD
0800	POD: Franzen FWS WRPS, 8-Point criteria, hole location, Fork lift availability, House keeping. Discision was made to calibrate logging equipment due to no forklift available to move pipe out of the way so the rig can be moved. The hole will be moved 3 feet South of the original hole per Mike walkups direction.
0830	need to rig mods to mast Russ and Jay to calibrate tooling
0845	waiting on Support on rig mods.
1035	Discision was made to go back to SX and pull pipe can't get service for calibrating. Head to SX
11:00	waiting on RCT's
11:30	RCT's on site, due lunch
12:00	waiting for RCT's
1246	RCT's on site, go to rig, we can up, and pull Rods move west Three feet, and trip again.
1250	Enter site and pull rods out of C8757B
1315	Moved rig, begin pushing on C8757
1725	Hit refusal at 11.5 feet, waiting on well to move.
1415	Rick Franzen called Harold, still no answer called the day.
1430	Head to office, departure K.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Snook, Izzy, Rick
HPT: Mincy, Clayton
FWS: Franzen

WEATHER: 41 F, mostly cloudy with light and variable winds.

DOWNTIME: .5
40 hrs waiting on support
2 hrs direction WRPS

DISCARDED ITEMS:
1 - Bag Bentonite
1 - Tip

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Ames
TITLE: ES TECHNICAL PREPARER
SIGNATURE: LO Ames

REVIEWED BY:
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: DATE: 1-24-13

10/06/09 Rev 1

ENERGYSOLUTIONS

DAILY WORK RECORD – CONTINUATION PAGE

Page 2 of 2

Date	Boring #	Continuation of Report No.
01-24-13	C8757	12

TIME	WORK SUMMARY
1500	AT office, complete paperwork.
1530	End Shift

NA

Report By	LO Amos	Reviewed By	M. WALKER		
Title	ES Technical Preparer	Title	ES Technical Reviewer	Date	1-24-13
Signature	Lo O. Amos	Signature			100609 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Decommission #C8757C, move to boring #C8759 and begin direct push activities.

DATE: 01-25-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 13

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.0 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1
2. N/A
3.
4.

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 (HHU CAT #4) HHUXL#3

BOREHOLE SUMMARY

Borehole # C8757C Tubing (25) @ 11.5 to 0 ft bgs; S.U. —

Borehole # C8759 Tubing (25) @ 0 to 34 ft bgs S.U. 3.5

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1. N/A
2. N/A
3. N/A

N/A

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Fire Extinguishers.**
0715	Travel to MO563 in 200W for P.O.D.
0740	ONSITE AT MO563. STANDBY FOR. P.O.D.
	P.O.D. BY R. FRANZEN FWS WRPS. Move rig to C8759
	Be safe, watch for ice, will calibrate at the cal mods also
0820	Head to drill and do inspection and warm up. Rig waiting for RCT's
0830	Support onsite, pull rods from C8757C, and move rig To C8759
0933	Rig moved, zone is up, ready to push
0938	Drive 2.5' Rods
1035	AT 24 feet, Take lunch
1045	Lunch
1115	Begin pushing
1145	Let head cool
1200	Begin pushing, pushing very hard
1230	Let head cool down AT 28~~8~~ feet
1250	Begin pushing
1310	Head hot Let cool, at 34 feet
1330	RCT Left, Head to office
1400	AT office do paper-work.
1430	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Villarreal, Rivera
HPT: Mincy, Clayton
FWS: Franzen

WEATHER: 34 F, cloudy with rain and freezing rain. Winds will be from the north at 5-10 mph.

DOWNTIME:
2hrs. Support

DISCARDED ITEMS:
1 - Bag Bentonite
1 - Tip
4 - Rims

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos

TITLE : ES TECHNICAL PREPARER

SIGNATURE: [signature]

REVIEWED BY: [signature]

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: [signature] DATE: 1-25-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue pushing boring #C8759 from 65.0' BGS to TD at ~130.0' BGS or refusal.

DATE: 01-28-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 14

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 (HHU CAT #4) HHUXL#3

BOREHOLE SUMMARY

Borehole # C8759 Tubing (2.5") @ 34.0' to 65.0' ft bgs; S.U. 5.0'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Construction PPE.**
0640	Travel to MO563 in 200W for P.O.D.
0715	Onsite at MO563. Standby for P.O.D. and HPT's.
0800	P.O.D. by R. Franzen FWS WRPS.
0830	"ACE" under RWP CO-762 Rev. 1 at MO563.
0840	Inspect and warm CAT HHU #4. Pushed from 34.0' B.G.S. to 53.0' B.G.S. NOTE: Shut down one time for crossover sub. and drive
-----	head to cool off.
1100	Lunch.
1130	Pushed from 53.0' B.G.S. to 65.0' B.G.S. Secured site for end of shift. NOTE: Shut down two times for crossover sub. and drive head
-----	to cool off.
1445	Travel to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Villarreal, Snook
HPT: Mincy, Clayton
FWS: Franzen

WEATHER: 43 F, mostly cloudy with a chance of rain. Winds from the southwest at 10-15 mph.

DOWNTIME: 45 Minutes for HPT's.

DISCARDED ITEMS:
1---2.5" Drive Head
1---Lynch Pin.

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS
TITLE: ES TECHNICAL PREPARER
SIGNATURE: L. O. Amos

REVIEWED BY: M. Walker
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. Walker DATE: 1-28-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue pushing boring #C8759 from 65.0' BGS to TD at ~130.0' BGS or refusal.

DATE: 01-29-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 15

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 (HHU CAT #4) HHUXL#3

BOREHOLE SUMMARY

Borehole # C8759 Tubing (2.5") @ 65.0' to 75.0' ft bgs; S.U. 3.0'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Construction PPE.**
0625	Travel to ENW and MO563 in 200W for P.O.D.
0740	Onsite at MO563. Standby for P.O.D. and HPT's.
0805	HPT's onsite at MMO563. P.O.D. by R. Franzen FWS WRPS.
0820	"ACE" under RWP CO-762 Rev. 1 at MO563.
0828	Inspect and warm CAT HHU #4. No problems noted.
0840	Pushed boring #C8759 from 65.0' BGS to 75.0' BGS.
1005	HPT's down posted RBA and began survey of CAT HHU #4 for transport to ENW.
1030	Lunch.
1100	HPT's completing survey of CAT HHU #4. Travelled to ENW and office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Villarreal, Snook
HPT: Mincy, Clayton
FWS: Franzen

WEATHER: 43 F, mostly cloudy with a chance of rain. Winds from the southwest at 10-15 mph.

DOWNTIME: 25 Minutes for HPT's

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: [illegible]
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: [illegible]

REVIEWED BY: [illegible]
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [illegible] DATE: 1-29-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Mobilize HHU XL #3 to site, set-up and continue pushing boring #C8759 from 75.0' BGS to TD at ~130.0' BGS or refusal.

DATE: 01-30-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 16

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1.		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 *HHU CAT #4* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8759 Tubing (2.5") @ 75.0' to 152.0' ft bgs; S.U. 2.C'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	N/A
2.	N/A	
3.	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Bloodborne Pathogens. (BBP)**
0635	Travel to ENW and load HHU XL #3 for transport to "SX" Tank Farm.
0810	Powers Equipment transporting HHU XL #3 to "SX" Tank Farm.
0850	Onsite at "SX" Tank Farm. Off load HHU XL #3. HPT's performing pre-survey for entry into RBA/RCA.
0905	Load CAT HHU #4 and Powers Equipment transporting it to ESGG shop at ENW. Offload CAT HHU #4 at ENW.
0950	Travel back to "SX" Tank Farm.
1055	Onsite at "SX" Tank Farm.
1100	Lunch.
1130	Standby for HPT's to "ACE".
1145	HPT's onsite. "ACE" under RWP CO-762 Rev. 1 at MO 563.
1200	Move HHU XL to boring #C8759 and set-up. Push from 75.0' BGS to TD at 152.0' BGS. NOTE: Stopped two times to let crossover
------	sub. and drive head cool for ~30 minutes. Secured site for end of shift.
1445	Travelled to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup
NCO: Villarreal, Snook, Rivera
HPT: Mincy, Clayton
FWS: Franzen

WEATHER: 49 F, mostly cloudy with a chance of rain. Winds from the southwest at 10-15 mph with gusts to 20 mph.

DOWNTIME: 1/4 HR. FOR HPT'S

DISCARDED ITEMS: 4 LYNCH PINS

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O AMOS
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O. Amos

REVIEWED BY: M. DUNKLIN
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 1-30-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Set-up HHU XL on boring #C8761 and begin direct push activities from GS | DATE: 01-31-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford | EXCAVATION: DAN-13-0036 U-DIG # 12285707 | REPORT #: 17

START CARD NO. SE47030 | DECOMMISSION NO. AE20137 | RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.		
3.	NA	
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No | HHU CAT #2 | HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole #C8759 Tubing (2.5") @ 152.8 to ft bgs; S.U. 2.0'

Borehole #C8761 Tubing (2.5") @ 0 to 104 ft bgs S.U. 6.0'

Borehole # — Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8759	N/A 150'-50'	M
2. —	N/A	
3. —	N/A	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Avoiding Electrical Shocks.**
0630	Travel to MO563 for P.O.D.
0705	AT site, wait for POD
0800	Support on site, POD. There will be a tour today (Harold, move rig to C8761, logging on C8759.
0840	Set up surveying site so we can move XL, Rig inspection 587 hrs.
0900	Rig setup, setup ROA,
0915	Begin pushing, Begin logging on C8759
0945	Head Hot, Let cool at 36 Feet
1010	Begin driving pipe
1033	Head hot Let cool at 58 Feet
1050	Drive pipe to 66 Feet
1100	Head is hot, Let cool,
1110	lunch
1140	head to rig
1150	Begin driving pipe
1300	Let head cool
1330	Drive pipe
1400	Let head cool at 104 Feet
1415	RCT leaves site, shut down, put away tooling.
1435	head to office
1500	Do paper work and time
1530	End shift
—	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Villarreal, Snook, Rivera
HPT: Clayton, Templeton
FWS: Franzen

WEATHER: 51 F, mostly cloudy with winds from the southwest at 5-15 mph.

DOWNTIME: 2.5 hrs. Support personel

DISCARDED ITEMS: 18 - Lynch Pins, 1 - Donut

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: Loames
TITLE: ES TECHNICAL PREPARER
SIGNATURE: J. O. Amos

REVIEWED BY: M. Walker
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. Walker DATE: 1-31-13

10/06/09 Rev 1

ENERGY SOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue pushing boring #C8761 from 104.0' BGS to TD or refusal. Complete moisture logging in #C8759 from 50.9' BGS to GS

DATE: 02-04-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 18

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8761 Tubing (2.5) @ 104 to 152.5 ft bgs; S.U. 2

Borehole # N/A Tubing (_) @ — to — ft bgs S.U.

Borehole # N/A Tubing (_) @ — to — ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8759 N/A	0	N/A
2. C8761 N/A	N/A	
3. — N/A	—	

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Everyone Is Responsible For Safety.**
0700	Travel to MO563 for P.O.D. Stop by energy Northwest and pickup gas cans
0750	AT site, waiting for POD
0800	POD: Logging on C8759, C8761. Finish driving C8761.
	watch slippery surfaces, Get "Aced in"
0830	AT rig, do inspection, warm up. 588 hrs.
0912	Let head cool, No Source today for logging, Crew will go to cal mods
0940	Drive to 134 Let head cool
0955	Let head cool.
1027	Drive pipe To 146 Feet
1045	Let head cool, Go to lunch room,
1100	lunch
1130	Head to rig
1135	AT Rig, push to 152.5' (Head adapter is cracked)
1200	AT TD at 152.5', Foldover rig and clear RBA
1230	Head to cal mod's To talk to Mike about adaptor.
1245	Mike walkup will have the XL hauled to the shop and
	repair adaptor. Head to shop to round up materials.
13:30	Found the parts for the adaptor at shop. Setup to
	change out adapter when rig arrives
1400	Head to office
1440	AT office do paperwork and time.
1530	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley
NCO: Villarreal, Snook
HPT: Clayton, Mincey
FWS: Franzen

WEATHER: 49 F, mostly cloudy with patchy fog. Winds will be light and variable.

DOWNTIME: waiting 15 min. POD

DISCARDED ITEMS:
5 - Lynch Pins
1 - Donut
1 - 2.5" Drive head

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: L O Amos

REVIEWED BY: M. Walkup
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. Walkup DATE: 2-4-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue moisture logging in #C8759 from 50.0' BGS and transport HHU XL from "SX" Tank Farm to ENW for repairs.

DATE: 02-05-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 19

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1
2. N/A
3.
4.

SITE/EQUIPMENT INSPECTION: *Yes* (No)

HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # C8759 *Tubing* (3.5") @ GS *to* 52.0 *ft bgs; S.U.* 2.0'

Borehole # C8761 *Tubing* (3.5") @ GS *to* 152.0 *ft bgs S.U.* 2.0'

Borehole # N/A *Tubing ( ) @ to ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring # Interval Type

1.C8759 51.0'-GS Moisture

2 C8761 151.0'-110.0' Moisture

3. N/A

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Hazard Awareness.**
0715	Travel to MO563 for P.O.D.
0745	Onsite at MO 563. Standby for P.O.D. and source for moisture logging.
0945	No P.O.D. was held by R. Franzen FWS WRPS. HPT and NCO getting source for moisture logging.
------	"ACE" under RWP #CO-762 Rev. 1 at MO563.
1000	Set-up moisture logging equipment on boring #C8759.
1015	Source is now onsite. Begin moisture logging on boring #C8759 from 50.0' BGS.
-----	NOTE: HPT's unable to begin post rad. survey on HHU XL due to moisture on the rig. Powers Equipment was cancelled.
1100	Lunch.
1130	Continued moisture logging on boring #C8759.
1200	Completed moisture logging on boring #C8759 from 50.0' BGS to GS. Moved equipment to boring #C8761 and set-up.
1245	Began moisture logging on boring #C8761 151.0' BGS to 110.0' BGS.
-----	NOTE: HPT's began post rad. survey on HHU XL at 1240 Hrs. Completed ½ of survey at 1350 Hrs. Not enough time to complete
-----	the survey. HPT's will complete the survey tomorrow morning.
1430	Secured site and traveled to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley, Ehrgott
NCO: Villarreal, Snook
HPT: Clayton, Mincey
FWS: Franzen

WEATHER: 50 F, mostly cloudy with southwest winds at 5-15 mph.

DOWNTIME: 2 ¼ Hrs. for source.

DISCARDED ITEMS:
1---Drive head adapter

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L. O. Amos

REVIEWED BY: [illegible]
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [illegible] DATE: 2-5-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: ~~Continue moisture~~ COMBO LABR, BGO ~~logging~~ in C8759 FROM 150.46' bgs ~~#C8761 from 110.0' BGS~~ and transport HHU XL from "SX" Tank Farm to ENW for repairs.

DATE: 02-06-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 20

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: *Yes* *No*

HHU CAT #2 *HHU CAT #4* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # C8759 Tubing (2.5") @ 6.5 to 152.0 ft bgs; S.U. 2.0'

Borehole # C8761 Tubing (2.5") @ 6.5 to 152.0 ft bgs S.U. 2.0'

Borehole # N/A Tubing (—) @ — to — ft bgs; S.U. —

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8759	150.46' to 146.96'	"Combo" BGO-LABR-
2 – N/A		
3 – N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Sun glasses vs. Safety glasses**
0715	Travel to MO563 for P.O.D. 0745 - PRE-JOB R. FRAHAM FWS
0845	SET UP FOR LOGGING C8759 W/ COMBO TOOL LABR, BGO
~~0900~~ 0900	NOTE: DURING SET UP MISSING POWER CORD FOR ENCODER
	TRAVEL TO ES OFFICE TO MEET THREE RIVERS SCIENTIFIC FOR POWER CORD, THEN TRAVEL BACK TO SX-FARM.
1130	START LOGGING C8759 FROM 150.46' bgs TO 146.96' bgs W/5' REPEAT.
1503	FINISH LOGGING FOR TODAY... SECURE WORK AREA, LEAVE SITE FOR ES OFFICE
1530	END OF SHIFT.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley, Ehrgott
NCO: Villarreal, Snook
HPT: Clayton, Mincey
FWS: Franzen

WEATHER: 51 F, mostly cloudy with southwest winds at 10-15 mph, gusting to 20 mph.

DOWNTIME: 1 1/2 HR – POWER CORD.

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: [illegible]
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [illegible] DATE: 2-6-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue combo logging in boring #C8759 from 140.96 ~~146.96~~' BGS and begin repairs on HHU XL at ENW

DATE: 02-07-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 21

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # C8759 Tubing (2.5") @ G.S. to 152.0 ft bgs; S.U. 3.0'

Borehole # C8761 Tubing (2.5") @ G.S. to 152.0 ft bgs S.U. 3.0'

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8759	140.96' ~~146.96'~~	
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Morning Wake Up.
~~0610~~ 0715	Travel to MO563 for P.O.D. by RICK FRANZAN FWS
0645	SIGN OFF ON PRE-JOB, SET FOR LOGGING
-	PRE-CHECKS WITH TOOLING
0745	START LOGGING FROM 144.0' bgs (3' OVERLAP)
0808	LOGGED TO 139.0' bgs RAN DOWN FOR 5' REPEAT. TO 144.0' bgs.
-	CONTINUE WITH "COMBO LOGGING" FROM 144.0 bgs
1412	STOPPED LOGGING @ 50.0' bgs TRIP OUT TOOLING CHECK
	RETURN ERROR = -0.38' RCT SURVEY COMBO TOOL.
1420	POST VERIFY, PICK UP AND SECURE WORK AREA.
1455	LEAVING SX-FARM FOR ES OFFICE
1530	END OF SHIFT.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley, Ehrgott Franzan
NCO: Villarreal, Snook
HPT: Clayton, Mincey
FWS: Franzen

WEATHER: 48 F, mostly cloudy with southwest winds at 5-10 mph.

DOWNTIME: NONE

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: MIKE EHRGOTT
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Mike Ehrgott

REVIEWED BY: [illegible]
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [illegible] DATE: 2-7-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Complete combo logging in boring #C8759 from 50.0' BGS to GS and complete repairs on HHU XL at ENW

DATE: 02-08-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 22

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1
2. N/A
3.
4.

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # 8759 Tubing (2.5") @ G.S. to 152' ft bgs; S.U. 2.0'

Borehole # 8761 Tubing (2.5) @ G.S. to 152' ft bgs S.U. 2.0'

Borehole # N/A Tubing (—) @ — to — ft bgs; S.U. —

GEOPHYSICAL LOGGING

Boring # Interval Type

1. C8759 50.0'-53.0' GS (BGO LABR Combo)
2 N/A
3 N/A

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Hydraulic Hoses And The Danger Of Leaks.**
0~~6~~5	Travel to MO563 for P.O.D. By RICK FRANZEN FWS
0725	SIGN PRE-JOB
0750	SET UP LOGGING EQUIP, PERFORM PRE-VERIFICATION CHECKS
0810	START LOGGING FROM 53' bgs @ 8759 WITH 5' REPEAT
—	(53' TO 48') ~~NOTE: ME~~
0839	CONTINUE LOGGING
1202	COMPLETE LOGGING TO G.S. FROM 53' bgs, RCT SURVEY
	COMBO TOOL, POST VERIFY CHECKS, PACK UP EQUIPMENT.
1241	SECURE WORK AREA, LEAVING FOR ES OFFICE
1430	END OF SHIFT

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley, Ehrgott, Icayan
NCO: Villarreal, Snook
HPT: Clayton, Mincey
FWS: Franzen

WEATHER: 43 F, partly cloudy with winds from the northwest at 5-10 mph.

DOWNTIME: NONE

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: MIKE EHRGOTT
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Mike Ehrgott

REVIEWED BY: M. Weakley
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 2-8-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin gamma logging in boring #C8761 from 151.0' BGS and standby for Powers Equipment to transport HHU XL from ESGG shop at ENW to "SX" Tank Farm.

DATE: 02-11-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 23

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # C8761 Tubing (2.5') @ GS to 152' ft bgs; S.U. 2.13'

Borehole # C8759 Tubing (2.5') @ G.S. to 152 ft bgs S.U. 2.0'

Borehole # — Tubing (—) @ — to — ft bgs; S.U. —

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8761	150.5' to 80'	Combo
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Infectious Diseases & First Aid Treatment.
0715	Travel to MO563 for P.O.D.
0745	POD by R. FRANZAN FWS
0810	SETUP FOR Logging @ C8761
-	PRE-VERIFY CHECKS ON TOOLING. (ZERO MARK @ -2.13')
0855	START Logging FROM 150.5' bgs @ C8761
0920	5' REPEAT, CONTINUE ~~FROM~~ ME Logging FROM 150.5' bgs.
1400	STOPPED Logging @ 80.0' bgs FROM 150.5' bgs (70.5' Logged)
-	TRIP TO SURFACE (RETURN ERROR -0.4') RCT SURVEY
-	COMBO TOOLING.
-	POST VERIFY CHECKS
1450	LEAVING SX-FARM FOR ES OFFICE. COMPLETE PAPER WORK.
1530	END OF SHIFT.

NOT USED ME 2-11-13

OPERATOR/LICENSE: N/A
ES SUPPORT: Walkup, Weakley, Ehrgott, Icayan
NCO: Villarreal, Snook
HPT: Clayton, Mincey
FWS: Franzen

WEATHER: 44 F, partly cloudy with light and variable winds.

DOWNTIME: NONE

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: MIKE EHRGOTT
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Mike Ehrgott

REVIEWED BY: M. Walkup
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. Walkup DATE: 2-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue gamma logging in boring #C8761 from 80.0' BGS and Powers Equipment will transport HHU XL from ESGG shop at ENW to "SX" Tank Farm.

DATE: 02-12-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 24

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2. N/A		
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # C8761 Tubing (2.5") @ G.S. to 152 ft bgs; S.U. 2.13

Borehole # ~~C8776~~ C8759 ME Tubing (2.5") @ G.S. to 152 ft bgs S.U. 2.0

Borehole # N/A Tubing (–) @ — to — ft bgs; S.U. —

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.C8761	80.0'- GS	Combo Gamma
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Chocking And Blocking.**
0615	Travel to MO563 for P.O.D.
0650	ARRIVED ON SITE SIGN POD SET UP FOR Logging ACTIVITIES
–	PRE-VERIFY CHECKS ON 'COMBO TOOLING.
0800	START Logging FROM 83' bgs NOTES: ISSUE WITH FIRST TWO RUN DOWNS FROM ~~G.S.~~ ME TO ~~83'~~ 83.0' TO G.S. NOTED WAS NOT CLICKING ON STOP TRACKING BEFORE going TO NEXT SCREEN ON COMPUTER.
0845	START Logging FROM 83' bgs (WITH 3' OVERLAP), 5' REPEAT 85' TO 78'
–	CONTINUE Logging
1418	COMPLETED Logging C8761 WITH "COMBO" TOOLING PERFORM POST CHECKS
–	ZERO SET @ ~~-2.19~~ ME -2.13', RETURN = -1.92' RETURN ERROR = -0.21'
1500	WORK ~~ERROR~~ AREA SECURE LEAVING SITE FOR E.S. OFFICE
1530	END OF SHIFT.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley, Ehrgott
NCO: Villarreal, Snook
HPT: Clayton, Ellingsworth
FWS: Franzen

WEATHER: 50 F, mostly cloudy with light and variable winds.

DOWNTIME: ~~1 Hr.~~ ME 45MIN ---Logging Operator

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: MIKE EHRGOTT
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Mike Ehrgott

REVIEWED BY: M. WALKUP
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 2-13-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue moisture logging in boring #C8761 from 110.0' BGS and remainder of ESGG crew is on standby for sample points to be picked in boring #C8760

DATE: 02-13-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 25

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2. N/A		
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8761 Tubing (2.5") @ G.S. to 152' ft bgs; S.U. 2.13'

Borehole # C8759 Tubing (2.5") @ G.S. to 152 ft bgs S.U. 2.0'

Borehole # C8760 Tubing (2 5/8") @ G.S. to 70' ft bgs; S.U. 4.3'

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.C8761	110.0'- G.S.	MOIST.
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: ~~Chocking-And-Blocking~~ ME MAKE THE BEST USE OF YOUR FIRST-AID-KIT.
0645	Travel to SMURF building and "ACE" under RWP CO-762 Rev. 1.
0740	Travel from SMURF building to "SX" Tank Farm for P.O.D.
0840	AT WORK AREA SETTING UP FOR MOISTURE LOGGING.
0930	PRE-~~JOB~~ ME VERIFY CHECKS FOR LOGGING EQUIPMENT
1015	START LOGGING @ 113.01' bgs @ C8761
1027	5' REPEAT 113.01' TO 108.01' AND CONTINUE LOGGING.
—	ES DRILLING CREW SETTING UP ON C8760 3' TO THE EAST OF
—	C8759 PER WRPS STARTED DRILLING FROM G.S. @ 1015.
1100	ES DRILLING CREW STOP FOR LUNCH C8760 @ 32' bgs
1130	RESUME DRILLING FROM 32'
1205	STOP DRIVING @ 38' bgs TO LET HEAD COOL
1235	RESUME DRIVING FROM 38' bgs
1300	STOP DRIVING TO LET HEAD COOL C8760 @ 52' bgs
~~1331~~ ME	1310 COMPLETED LOGGING TO G.S.
1330	RESUME DRILLING FROM 52' bgs
1335	LOGGING CREW LEAVING SITE FOR ES OFFICE
1430	AT 70' PUT TOOLS AWAY
1450	Head to office
1520	Paper work
1530	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Walkup, Weakley, Ehrgott
NCO: Villarreal, Snook
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 55 F, mostly cloudy with a chance of showers. Winds from the southwest at 10-15 mph.

DOWNTIME: NONE

ME DISCARDED ITEMS:
~~N/A~~ 1 - Drive 2 3/4 Head
1 - Point
12 - Lynch Pins
2 - O-rings

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: MIKE EHRGOTT
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Mike Ehrgott

REVIEWED BY: M. Weakley
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. Weakley DATE: 2-13-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue pushing boring #C8760 from 70.0' BGS to 1st sample interval at 121.0' BGS

DATE: 02-14-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 26

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.1 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8760 Tubing (2 5/8) @ 70' to 121 ft bgs; S.U. 1.3

Borehole # ___ Tubing ( ) @ to ft bgs S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: The Ten Commandments Of Good Safety Habits.
0640	Head to site (SX)
0720	on site waiting for POD
0820	RCT's on site, POD, Ace, he
0830	warm up rig
0845	Begin pushing 2 5/8"
0910	head is hot, let cool down @ 88 feet
0940	Drive to 104'
1005	AT 104 let head cool
1035	Drive Pipe
1100	AT 114 feet (Lunch)
1130	Drive Pipe
1155	AT Sample depth at 121', no sampling today due to Support
1200	Head to Shop
1530	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley
NCO: Villarreal, Snook
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 50 F, partly cloudy with winds from the southwest at 5-10 mph.

DOWNTIME: 4hrs. Support

DISCARDED ITEMS:
1- inner rod back puller
5- Lynch Pin's
1- Drive head pin

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: L O. Amos

REVIEWED BY: M. [illegible]
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 2-14-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin sampling activities in boring #C8760 from 121.0' BGS.

DATE: 02-19-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 27

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.2 JHA-GG-NWOP-RO-1858

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

SAMPLING SUMMARY

Sample #'s	Interval	%
1 See Below	121.0'-123.0'	100%
2. N/A		
3. N/A		
4. N/A		

BOREHOLE SUMMARY

Borehole # C8760 Tubing (5 5/8) @ 121.0' to 123.0' ft bgs; S.U. 1.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

WORK SUMMARY

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Fatality Investigation Report.**
0645	Travel to "SX" Tank Farm.
0715	Onsite at "SX" Tank Farm. Standby for P.O.D.
0800	P.O.D. by R. Franzen FWS WRPS. "ACE" under RWP CO-762 Rev. 2.
0900	Fueled, inspected and warmed HHU XL. No problems noticed.
0915	Pulled inner rod and dummy tip.
0930	Standby for NCO's to photograph sampler. No liners were in the sampler. NCO's brought us a complete one.
0955	Ran inner rod and sampler in boring to 121.0' BGS. Drove 1st sample from 121.0' BGS to 123.0' BGS and retrieved. 100% recovery.
1030	Standby for NCO's to process sample.
1100	Lunch.
1130	Standby for IH support. Need to take air sample from boring before proceeding with sampling. Secured site for end of shift.
------	Traveled to office. Completed paperwork and timecard.
1530	End of shift.
------	NOTE: Sample #'s: Liners---B2NPN4, B2NPN5, B2NPN6. Sample # for shoe---B2NPN7.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Villarreal, Snook, Sharp
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 45 F, mostly cloudy with a chance of showers. Winds from the northwest at 5-10 mph.

DOWNTIME: 4 Hrs.---IH support, 45 minutes---P.O.D., 30 minutes---NCO's to process sample.

DISCARDED ITEMS:
3---Sample liners
6---Sample liner caps

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: Olin Amos
TITLE: *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: D. Walkup
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] DATE: 2-19-13

10/06/09 Rev 1

121-123

FIELD CHARACTERIZATION SOIL/OTHER SOLIDS SAMPLING REPORT

PROJECT(S) Direct Push Samples for SX Pore Water Extraction Test Project	**PAGE** 1 **OF** 2
	DATE/TIME
SAF NO.(S) V13-001	
LOCATION C8760 I001	**LOGBOOK NO./PAGE**
WELL NAME N/A ORIGINAL	**WELL ID** N/A **ACTUAL DEPTH** ☐ft ☐m
BOTTOM OF CASING (bgs) ☐ft ☐m	**BOTTOM OF BOREHOLE (bgs)** ☐ft ☐m

SAMPLES COLLECTED

TOTAL NUMBER OF BOTTLES 4 **TOTAL NUMBER OF CHAINS** 2 **COLLECTOR**

222-S **V13-001-001**

SAMPLE NO.	BOTTLE QTY/SIZE/TYPE	LOT NO.	PRESERVATION	ANALYSIS
B2NPN4	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
B2NPN5	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
B2NPN6	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

222-S **V13-001-002**

SAMPLE NO.	BOTTLE QTY/SIZE/TYPE	LOT NO.	PRESERVATION	ANALYSIS
B2NPN7	1 / 500mL / G		Cool~6C	Generic Testing;

PRINTED BY ASHRUM ON 2/6/2013 10:33:56 AM

A-6004-701 (REV.0)

121-123

FIELD CHARACTERIZATION SOIL/OTHER SOLIDS SAMPLING REPORT

PROJECT(S) Direct Push Samples for SX Pore Water Extraction Test Project	**PAGE** 2 **OF** 2
	DATE/TIME
SAF NO.(S) V13-001	
LOCATION C8760 I001	**LOGBOOK NO./PAGE**
WELL NAME N/A ORIGINAL	**WELL ID** N/A **ACTUAL DEPTH** ☐ ft ☐ m
BOTTOM OF CASING (bgs) ☐ ft ☐ m	**BOTTOM OF BOREHOLE (bgs)** ☐ ft ☐ m
SAMPLES COLLECTED	
TOTAL NUMBER OF BOTTLES 4 **TOTAL NUMBER OF CHAINS** 2 **COLLECTOR**	

FIELD INFORMATION

WHERE ARE SAMPLES LOCATED AT THIS TIME? ☐ WSCF ☐ 222-S ☐ MO-413 ☐ MO-745 ☐ 6269 ☐ OTHER

CONTAINER/DRUM/TOTE/BOX

SAMPLE MATRIX DESCRIPTION ☐ SOIL ☐ SLUDGE ☐ RESIN ☐ GAC ☐ FILTER PAPER ☐ OTHER

FURTHER SAMPLE MATRIX EXPLANATION/DESCRIPTION [NOTE ANY ODOR, COLOR, TEXTURE (E.G., SLIMY, OILY, GRANULAR, ETC.)]

FIELD OBSERVATIONS

WEATHER

FIELD COMMENTS

SUPPORT PERSONNEL

SAMPLES SURVEYED BY RCT ☐ YES ☐ NO

IS A BLUE CARD REQUIRED ☐ YES ☐ NO **BLUE CARD NO** _____

IS SRS PROVIDED AND COMPLETE ☐ YES ☐ NO

	PRINT NAME	SIGN NAME	DATE
RECORDED BY			
INDEPENDENT REVIEW			

PRINTED BY ASHRUM **ON** 2/6/2013 10:33:56 AM

A-6004-701 (REV 4)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8760 from 123.0' BGS.

DATE: 02-20-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 28

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.2 JHA-GG-NWOP-RO-1858

SITE/EQUIPMENT INSPECTION: *Yes* (No)

HHU CAT #2 *HHU CAT #4* (HHUXL#3)

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

BOREHOLE SUMMARY

Borehole # C8760 Tubing (5 1/8") @ 123' to N/A ft bgs; S.U. 1.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Smoke Detectors-A Life Saving Warning.**
0645	Travel to "SX" Tank Farm.
0715	Onsite at "SX" Tank Farm. Standby for P.O.D.
0745	No P.O.D. was given by R. Franzen FWS for WRPS. IH technicians were questioning their qualifications for doing the required
------	sampling activities. Also in question was the length of tubing required and their instruments capability of handling it. ESGG crew
------	placed on standby.
1100	Lunch
1130	ESGG crew on standby waiting for determination from IH technicians.
1230	Travel to office. Complete paperwork and timecard. ESGG crew still on standby.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Villarreal, Snook, Sharp
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 45 F, partly cloudy and cool with winds from the southwest at 5-10 mph.

DOWNTIME: 9 Hrs.---Lack of IH support.

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY:
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 3-20-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8760 from 123.0' BGS if IH support is available.

DATE: 02-21-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 29

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.2 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.		
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8760 Tubing (2 5/8) @ 123 to — ft bgs; S.U. 13

Borehole # 1CA Tubing ( ) @ to ft bgs S.U.

Borehole # CA Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Machine Safety-Requirements For Safeguards
0700	Head to site AT SX
0730	On site, waiting on POD
0800	Rick Franzen on site, bought a letter in from Jennifer Dobb saying we should have a decision by 9:00. (STandby)
0915	Green light from Jennifer Dobbs to go ahead and sample the hole by IH Tech. STandby waiting for POD and IH
1008	IH on site, Annette (ESGG Safety) on site, Rick will now hold POD. N
1015	No POD yet, IH had to go get his instrument and ACE in (STANDBY)
1030	POD - Sampling hole by IH (Air Sample and background Air samples were the topics.
1040	AT Rig, IH Pulling Air Samples.
1105	Background samples complete, run sampling tube in hole. N
1130	No hits at 10 Feet Lowered tubing to 120 Feet. Meter evened out at 99.73 PPM. (don't know what it is)
1145	SHut down site, cap hole until They figure out what to do next. Leave site and head to yard to round up Material
1430	Head to office
1500	Paper work
1530	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup,
NCO: Villarreal, Snook
HPT: Clayton, Mincy
FWS: Franzen
GG Annette
IH

WEATHER: 47 F, partly cloudy with a chance of showers. Winds from the southwest at 5-20 mph.

DOWNTIME: 9 hrs. due to suppo-T

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O AMOS
TITLE : ES TECHNICAL PREPARER
SIGNATURE: L O Amos

REVIEWED BY: [illegible]
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [illegible] DATE: 2-21-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8760 from 123.0' BGS if IH support is available.		DATE: 02-22-13
LOCATION: "SX" Tank Farm 200 W. Area Hanford	EXCAVATION: DAN-13-0036 U-DIG # 12285707	REPORT #: 30

START CARD NO. SE47030 | DECOMMISSION NO. AE20137 | RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: *Yes* (*No*) | *HHU CAT #2* *HHU CAT #4* (*HHUXL#3*)

BOREHOLE SUMMARY

Borehole # C8760 *Tubing* 2 5/8 @ 123 *to* N/A *ft bgs; S.U.* 1.3'

Borehole # N/A *Tubing* ( ) @ *to* *ft bgs S.U.*

Borehole # N/A *Tubing* ( ) @ *to* *ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Safe Attitudes.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D. NOTE: No P.O.D. was held due to no work package.
0800	Standby for work package to be released with changes for air sampling.
1100	Lunch.
1130	Standby for work package to be released with changes for air sampling. Travel to office. Completed paperwork and timecard.
1430	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup* *NCO: Villarreal, Snook* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 51 F, mostly cloudy with a chance of showers. Winds from the southwest at 15-25 mph.** **DOWNTIME: 8 Hrs. for work package**	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O Amos	**REVIEWED BY:** M Dennis
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: L O Amos	**SIGNATURE:** M Dennis **DATE:** 2-22-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8760 from 123.0' BGS if IH support is available.		DATE: 02-25-13
LOCATION: "SX" Tank Farm 200 W. Area Hanford	EXCAVATION: DAN-13-0036 U-DIG # 12285707	REPORT #: 31

START CARD NO. SE47030 | DECOMMISSION NO. AE20137 | RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: *Yes* (*No*) | *HHU CAT #2* *HHU CAT #4* (*HHUXL#3*)

BOREHOLE SUMMARY

Borehole # C8760 *Tubing* (5") @ 123.0' *to* N/A *ft bgs; S.U.* 1.3'

Borehole # N/A *Tubing* ( ) @ *to* *ft bgs S.U.*

Borehole # N/A *Tubing* ( ) @ *to* *ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1 N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Safe Attitudes.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0930	P.O.D. was held by R. Franzen FWS WRPS.
1000	ESGG crew placed on standby due to winds >20 mph. (AOP-008)
1100	Lunch
1130	ESGG crew on standby due to winds >20 mph. (AOP-008) Travel to office. Complete paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup* *NCO: Villarreal, Snook* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 54 F, mostly cloudy with a chance of showers. Winds from the southwest at 10-15 mph.** **DOWNTIME: 9 Hrs.---AOP-008**	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O. Amos

REVIEWED BY:
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 2-25-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8760 from 123.0' BGS.

DATE: 02-26-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 32

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

BOREHOLE SUMMARY

Borehole #C8762 Tubing (5 1/8") @ 123.0' to N/A ft bgs; S.U. 1.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Preventing Strains & Sprains.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0815	P.O.D. was held by R. Franzen FWS WRPS. A safety concern was raised about the previous air sample reading at ~120.0' BGS in
------	boring #C8760. The previous air sample obtained showed a reading of ~100 PPM of an unknown origin. The decision was made by
------	R. Franzen FWS for WRPS to have the IH Technicians to obtain another air sample and take it to the SMURF building for analysis.
------	The air sample and an exhaust of the HHU XL after initial startup was taken at ~1000 Hrs. The air sample in boring #C8760 at ~120.0'
------	BGS was collected and taken for analysis.
1000	ESGG crew on standby awaiting the air sample analysis results.
1100	Lunch.
1130	ESGG crew on standby awaiting the air sample analysis results. Traveled to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Villarreal, Snook, Sharp
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 50 F, mostly cloudy with a chance of showers. Winds from the southwest at 5-15 mph.

DOWNTIME: 9 Hrs. for air sample results

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O. Amos

REVIEWED BY: M. Weakley
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 3-26-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8760 from 123.0' BGS after air sample analysis has been received.		**DATE: 02-27-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 33**

START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY	**SITE/EQUIPMENT INSPECTION: (Yes) No**	*HHU CAT #2 HHU CAT #4 (HHUXL#3)*

Sample #'s Interval %

1. *See Below 123.0'-125.0' 100%*
2. *See Below 125.0'-127.0' 100%*
3. *N/A*
4. *N/A*

BOREHOLE SUMMARY

Borehole #C8760 Tubing (5 1/2") @123' to 127' ft bgs; S.U. 1.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Head Injuries-After The Fall.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0800	P.O.D. was held by R. Franzen FWS WRPS.
0815	"ACE" under RWP CO-762 Rev. 3 at MO 563.
0830	Inspect and warm HHU XL. No problems noted. WRPS IH Technicians monitoring for diesel exhaust.
0845	Run inner string and sampler in boring #C8760 to 123.0' BGS.
0915	Standby for an additional WRPS HPT.
1000	HPT onsite. Drove sample from 123.0' BGS to 125.0' BGS and retrieved. 100% recovery.
1045	Run inner string and sampler in boring #C8760 to 125.0' BGS.
1100	Lunch.
1130	Standby for WRPS IH Technicians.
1240	IH Technicians onsite. Drove sample from 125.0' BGS to 127.0' BGS and retrieved. 100% recovery.
1320	IH Technicians pulled air sample from ~120.0' BGS in boring #C8760. The air sample reading was 7.34 PPM.
1330	Standby for direction from WRPS on whether to move to boring #C8762 or decommission boring #C8760. The sampling plan for
------	silica is not in the work package.
1400	Travelled to office. Completed paperwork and timecard.
1530	End of shift.
------	NOTE: Sample #'s 123.0' BGS to 125.0' BGS, B2NPN9 (Liner), B2NPP0 (Liner), B2NPP1 (Liner), and B2NPP2 (Shoe).
------	NOTE: Sample #'s 125.0' BGS to 127.0' BGS, B2NPP4 (Liner), B2NPP5 (Liner), B2NPP6 (Liner), and B2NPP7 (Shoe).
	N/A

OPERATOR/LICENSE: Amos/1224 ***ES SUPPORT:** Weakley, Walkup* *NCO: Villarreal, Snook, Sharp* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 54 F, mostly cloudy with winds from the southwest at 5-10 mph.** **DOWNTIME: 45 minutes POD, 45 minutes HPT, 1 hour and ten minutes for IH tech.**	**DISCARDED ITEMS:** 12---Liner caps 6---Liners 4---"O" rings

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS	**REVIEWED BY:** M. WEAKLEY
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: Lo Amos	**SIGNATURE:** M. Weakley **DATE:** 2-27-13

10/06/09 Rev 1

FIELD CHARACTERIZATION SOIL/OTHER SOLIDS SAMPLING REPORT

PROJECT(S) Direct Push Samples for SX Pore Water Extraction Test Project		**PAGE** 1 **OF** 2	
		DATE/TIME	
SAF NO.(S) V13-001			
LOCATION C8760 I002		**LOGBOOK NO./PAGE**	
WELL NAME N/A **ORIGINAL**		**WELL ID** N/A	**ACTUAL DEPTH** ☐ft ☐m
BOTTOM OF CASING (bgs) ☐ft ☐m		**BOTTOM OF BOREHOLE (bgs)**	☐ft ☐m
SAMPLES COLLECTED			
TOTAL NUMBER OF BOTTLES 4	**TOTAL NUMBER OF CHAINS** 2	**COLLECTOR**	

222-S **V13-001-004**

SAMPLE NO.	BOTTLE QTY/SIZE/TYPE	LOT NO.	PRESERVATION	ANALYSIS
B2NPN9	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
B2NPP0	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
B2NPP1	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

222-S **V13-001-005**

SAMPLE NO.	BOTTLE QTY/SIZE/TYPE	LOT NO.	PRESERVATION	ANALYSIS
B2NPP2	1 / 500mL / G		Cool~6C	Generic Testing;

PRINTED BY ASHRUM ON 2/6/2013 10:33:58 AM

A-6004-701 (REV.0)

FIELD CHARACTERIZATION SOIL/OTHER SOLIDS SAMPLING REPORT

PROJECT(S) Direct Push Samples for SX Pore Water Extraction Test Project		**PAGE** 2 **OF** 2	
		DATE/TIME	
SAF NO.(S) V13-001			
LOCATION C8760 I002		**LOGBOOK NO./PAGE**	
WELL NAME N/A **ORIGINAL**		**WELL ID** N/A	**ACTUAL DEPTH** ☐ ft ☐ m
BOTTOM OF CASING (bgs) ☐ ft ☐ m		**BOTTOM OF BOREHOLE (bgs)**	☐ ft ☐ m
SAMPLES COLLECTED			
TOTAL NUMBER OF BOTTLES 4	**TOTAL NUMBER OF CHAINS** 2	**COLLECTOR**	

FIELD INFORMATION
WHERE ARE SAMPLES LOCATED AT THIS TIME? ☐ WSCF ☐ 222-S ☐ MO-413 ☐ MO-745 ☐ 6269 ☐ OTHER
CONTAINER/DRUM/TOTE/BOX
SAMPLE MATRIX DESCRIPTION ☐ SOIL ☐ SLUDGE ☐ RESIN ☐ GAC ☐ FILTER PAPER ☐ OTHER
FURTHER SAMPLE MATRIX EXPLANATION/DESCRIPTION [NOTE ANY ODOR, COLOR, TEXTURE (E.G., SLIMY, OILY, GRANULAR, ETC.)]
FIELD OBSERVATIONS
WEATHER
FIELD COMMENTS
SUPPORT PERSONNEL
SAMPLES SURVEYED BY RCT ☐ YES ☐ NO
IS A BLUE CARD REQUIRED ☐ YES ☐ NO **BLUE CARD NO** _____
IS SRS PROVIDED AND COMPLETE ☐ YES ☐ NO
RECORDED BY _____ (PRINT NAME) _____ (SIGN NAME) _____ (DATE)
INDEPENDENT REVIEW _____ (PRINT NAME) _____ (SIGN NAME) _____ (DATE)

PRINTED BY ASHRUM **ON** 2/6/2013 10:33:58 AM **A-6004-701 (REV 4)**

Shoe A B C
100% 100% 100% 80%

FIELD CHARACTERIZATION SOIL/OTHER SOLIDS SAMPLING REPORT

PROJECT(S) Direct Push Samples for SX Pore Water Extraction Test Project		**PAGE** 1 **OF** 2	
		DATE/TIME	
SAF NO.(S) V13-001			
LOCATION C8760 I003		**LOGBOOK NO./PAGE**	
WELL NAME N/A **ORIGINAL**		**WELL ID** N/A	**ACTUAL DEPTH** ☐ft ☐m
BOTTOM OF CASING (bgs) ☐ft ☐m		**BOTTOM OF BOREHOLE (bgs)**	☐ft ☐m
SAMPLES COLLECTED			
TOTAL NUMBER OF BOTTLES 4	**TOTAL NUMBER OF CHAINS** 2	**COLLECTOR**	

222-S **V13-001-007**

SAMPLE NO.	BOTTLE QTY/SIZE/TYPE	LOT NO.	PRESERVATION	ANALYSIS
B2NPP4	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
B2NPP5	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
B2NPP6	1 / 160g / Liner		Cool~6C	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

222-S **V13-001-008**

SAMPLE NO.	BOTTLE QTY/SIZE/TYPE	LOT NO.	PRESERVATION	ANALYSIS
B2NPP7	1 / 500mL / G		Cool~6C	Generic Testing;

PRINTED BY ASHRUM ON 2/6/2013 10:34:00 AM

A-6004-701 (REV.0)

FIELD CHARACTERIZATION SOIL/OTHER SOLIDS SAMPLING REPORT

PROJECT(S) Direct Push Samples for SX Pore Water Extraction Test Project		**PAGE** 2 **OF** 2	
		DATE/TIME	
SAF NO.(S) V13-001			
LOCATION C8760 I003		**LOGBOOK NO./PAGE**	
WELL NAME N/A **ORIGINAL**		**WELL ID** N/A	**ACTUAL DEPTH** ☐ ft ☐ m
BOTTOM OF CASING (bgs) ☐ ft ☐ m		**BOTTOM OF BOREHOLE (bgs)**	☐ ft ☐ m
SAMPLES COLLECTED			
TOTAL NUMBER OF BOTTLES 4	**TOTAL NUMBER OF CHAINS** 2	**COLLECTOR**	

FIELD INFORMATION

WHERE ARE SAMPLES LOCATED AT THIS TIME? ☐ WSCF ☐ 222-S ☐ MO-413 ☐ MO-745 ☐ 6269 ☐ OTHER

CONTAINER/DRUM/TOTE/BOX

SAMPLE MATRIX DESCRIPTION ☐ SOIL ☐ SLUDGE ☐ RESIN ☐ GAC ☐ FILTER PAPER ☐ OTHER

FURTHER SAMPLE MATRIX EXPLANATION/DESCRIPTION [NOTE ANY ODOR, COLOR, TEXTURE (E.G., SLIMY, OILY, GRANULAR, ETC.)]

FIELD OBSERVATIONS

WEATHER

FIELD COMMENTS

SUPPORT PERSONNEL

SAMPLES SURVEYED BY RCT ☐ YES ☐ NO

IS A BLUE CARD REQUIRED ☐ YES ☐ NO **BLUE CARD NO** _____

IS SRS PROVIDED AND COMPLETE ☐ YES ☐ NO

RECORDED BY PRINT NAME _____ SIGN NAME _____ DATE _____

INDEPENDENT REVIEW PRINT NAME _____ SIGN NAME _____ DATE _____

PRINTED BY ASHRUM **ON** 2/6/2013 10:34:00 AM

A-6004-701 (REV 4)

Shoe A B C

100% 100% 100% 100%

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Either decommission boring #C8760 or move to boring #C8762 and begin sampling activities. **DATE: 02-28-13**

LOCATION: "SX" Tank Farm 200 W. Area Hanford **EXCAVATION: DAN-13-0036** U-DIG # 12285707 **REPORT #: 34**

START CARD NO. SE47030 **DECOMMISSION NO. AE20137** **RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**

SAMPLING SUMMARY

Sample #'s	Interval	%
1 N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 *HHU CAT #4* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8760 Tubing (5 1/8") @ 123' to 127' ft bgs; S.U. 1.3'

Borehole # C8762 Tubing (5 1/8") @ GS to 69 ft bgs S.U. 5.5'

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: This'll Kill You.**
0630	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0800	P.O.D. was held by R. Franzen FWS WRPS.
0815	"ACE" under RWP CO-762 Rev. 3 at MO 563.
0845	Fuel, inspect and warm HHU XL. No problems noted.
0900	Ran inner string and dummy tip back in sample boring #C8760 and drove to original TD at 127.0' BGS. Inner string and dummy tip
------	were left in the boring and the boring was capped.
0925	Moved HHU XL and support equipment to sample boring #C8762 and set-up.
0955	Drove dual wall with dummy tip from GS to 18.0' BGS.
1100	Lunch.
1130	Drove dual wall with dummy tip from 18.0' BGS to 29.0' BGS.
1200	Stopped and let crossover sub. and drive head cool.
1230	Drove dual wall with dummy tip from 29.0' BGS to 49.0' BGS.
1300	Stopped and let crossover sub. and drive head cool.
1320	Drove dual wall with dummy tip from 49.0' BGS to 57.0' BGS.
1340	Stopped and let crossover sub. and drive head cool.
1405	Drove dual wall with dummy tip from 57.0' BGS to 69.0' BGS.
1445	Stopped and let crossover sub. and drive head cool. Traveled to office. Completed paperwork and timecard.
1530	End of shift.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Villarreal, Snook, Sharp
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 61 F, mostly cloudy with winds from the southwest at 5-10 mph.

DOWNTIME: 45 minutes for P.O.D.

DISCARDED ITEMS:
1---2 5/8" drive head
8---Lynch pins
1---Nylatron doughnut
2---"O" Rings

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O. Amos

REVIEWED BY: M. Walkup
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: M. Walkup **DATE:** 2-28-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8762 | DATE: 03-04-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford | EXCAVATION: DAN-13-0036 U-DIG # 12285707 | REPORT #: 35

START CARD NO. SE47030 | DECOMMISSION NO. AE20137 | RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858

SITE/EQUIPMENT INSPECTION: (Yes) No | HHU CAT #2 HHU CAT #4 (HHUXL#3)

SAMPLING SUMMARY

Sample #'s	Interval	%
1 N/A		
2. N/A		
3. N/A		
4. N/A		

BOREHOLE SUMMARY

Borehole # C8762 Tubing (5 1/2") @ 69.0' to 123.0' ft bgs; S.U. 1.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Near Miss-The One That Almost Happened.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0830	P.O.D. was held by R. Franzen FWS WRPS.
0840	"ACE" under RWP CO-762 Rev. 3 at MO 563.
0850	Inspect and warm HHU XL. No problems noted.
0910	Drove dual wall with dummy tip from 69.0' BGS to 85.0' BGS.
0945	Stopped and let crossover sub. and drive head cool.
1015	Drove dual wall with dummy tip from 85.0' BGS to 104.0' BGS.
1100	Lunch.
1130	Drove dual wall with dummy tip from 104.0' BGS to 1st sample interval depth at 123.0' BGS.
1230	Standby for IH Technicians. Secured site and travelled to office. Completed paperwork and timecard.
1530	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Villarreal, Snook
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 53 F, mostly sunny with winds from the southwest at 5-10 mph.

DOWNTIME: 1 ¼ Hr.---P.O.D. and 3 Hrs. for IH Technicians

DISCARDED ITEMS:
7---Lynch Pins
3---Nylatron doughnuts
1---Large connecting pin

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L.O. Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L.O. Amos

REVIEWED BY: D. Weakley
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] DATE: 3-4-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8762 | DATE: 03-05-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford | EXCAVATION: DAN-13-0036, U-DIG # 12285707 | REPORT #: 36

START CARD NO. SE47030 | DECOMMISSION NO. AE20137 | RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s	Interval	%
1		
2.	N/A	
3.		
4.		

SITE/EQUIPMENT INSPECTION: Yes (No) | HHU CAT #2 | HHU CAT #4 | (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8762 Tubing (5 1/8") @ 133.6' to N/A ft bgs; S.U. 1.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Springtime Yard & Field Maintenance.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for work package to be released.
1100	Lunch.
1130	Standby for work package to be released. Travelled to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup
NCO: Villarreal, Snook, Sharp
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 48 F, mostly cloudy with a chance of rain. Winds will be light and variable.

DOWNTIME: 9 Hrs. for work package.

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Lo A. Amos

REVIEWED BY: M. Weakley
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. Weakley DATE: 3-5-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8762.		**DATE: 03-06-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 37**
START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY Sample #'s Interval % 1. See Below 123.0'-125.0' 100% 2. 3. 4.	**SITE/EQUIPMENT INSPECTION:** (Yes) No	*HHU CAT #2 HHU CAT #4 (HHUXL#3)*

BOREHOLE SUMMARY

Borehole # C8762 Tubing (2.5" SJ) @ 123' to 125' ft bgs; S.U. 1.3'

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Snake Bite.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0815	P.O.D. was held by R. Franzen FWS WRPS.
0845	"ACE" under RWP CO-762 Rev. 3 at MO 563.
0910	Inspect and warm HHU XL. No problems noted.
0915	Pulled inner string and dummy tip.
0932	IH Technicians collect air sample from ~120.0' BGS. Borehole was reading 77 ppm. Sample was taken to lab. for analysis.
0954	Ran inner string and sampler back in borehole. Sample was not driven. Stndby for lab. analysis of bag sample.
1010	Standby for analysis of air sample that was collected by IH Technicians.
1100	Lunch.
1130	Standby for analysis of air sample that was collected by IH Technicians.
1220	Notified by IH Technicians that air sample bag had leaked and no analysis was completed. Decision was made by R. Franzen FWS
------	WRPS to push the sample from 123.0' BGS to 125.0' BGS.
1225	Sample was driven from 123.0' BGS to 125.0' BGS at 1227 Hrs. and retrieved. 100% recovery. Sample #'s: B2NRB0 (Shoe),
------	B2NR97 (Liner A), B2NR98 (Liner B) and B2NR99 (Liner C).
1245	IH Technicians collected another air sample. Borehole was reading 58 ppm. Sample bag was taken to lab. for analysis.
1310	Standby for analysis of air sample that was collected by IH Technicians. Secured site. Travelled to office. Completed paperwork and
------	timecard.
1530	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup* *NCO: Villarreal, Snook, Sharp* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 53 F, mostly cloudy with rain showers. Winds will be light and variable.** **DOWNTIME: 1 ¼ Hrs. for P.O.D. and 4 Hrs. for IH Techs.**	**DISCARDED ITEMS:** 6---Sample liner caps. 3---Sample liners. 2---"O" rings.

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O Amos	**REVIEWED BY:** M. Williams
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: L O Amos	**SIGNATURE:** M. Williams **DATE:** 3-6-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue sampling activities in boring #C8762.		**DATE: 03-07-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 38**

START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY Sample #'s Interval % 1. See below 125.0'-127.0' 100% 2. See below 127.0'-129.0' 100% 3. N/A 4. N/A	**SITE/EQUIPMENT INSPECTION: (Yes) No**	*HHU CAT #2 HHU CAT #4 (HHUXL#3)*

BOREHOLE SUMMARY

Borehole #C8762 Tubing (2 5/8") @ 105.0 to 128.0 ft bgs; S.U. 1.3'

Borehole #C8759 Tubing (2 1/2") @ 152.0 to 126.5 ft bgs S.U. 3.3'

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Snake Bite.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0840	P.O.D. was held by R. Franzen FWS WRPS.
0855	"ACE" under RWP CO-762 Rev. 3 at MO 563.
0905	Inspect and warm HHU XL. No problems noted.
0909	Ran inner string and sampler in borehole. Pushed sample from 125.0' BGS to 127.0' BGS at 0926 Hrs. and retrieved. 100% recovery.
0945	Ran inner string and sampler in borehole. Pushed sample from 127.0' BGS to 129.0' BGS at 1014 Hrs. and retrieved. 100% recovery.
1040	IH Technicians collected air sample from ~120.0' BGS. Borehole was reading 25 ppm.
1100	Lunch.
1130	Ran inner string and dummy in borehole to 129.0' BGS. Borehole was capped and secured.
1200	Mobilized HHU XL and support equipment to exploratory boring #C8759 and set-up.
1225	Knocked out disposable tip. Back-pulled 2.5" casing from 152.0' BGS to 126.5' BGS and decommissioned with granular bentonite
------	in preparation for installation of 1" PVC well for falling head test.
1315	Travelled to chem. storage and ENW for supplies.
1415	Travelled to office. Completed paperwork and timecard.
1530	End of shift.
------	NOTE: Sample #'s for 125.0' BGS to 127.0' BGS. B2NRB1 (Liner A), B2NRB2 (Liner B), B2NRB3 (Liner C) and B2NRB4 (Shoe).
------	NOTE: Sample #'s for 127.0' BGS to 129.0' BGS. B2NRB5 (Liner A), B2NRB6 (Liner B), B2NRB7 (Liner C) and B2NRB8 (Shoe).
	N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup* *NCO: Villarreal, Snook, Sharp* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 48 F, partly cloudy with winds from the southwest at 10-15 mph, gusting to 25 mph.** **DOWNTIME: 1 Hr. and 25 minutes for P.O.D.**	**DISCARDED ITEMS:** 12---Sample liner caps 6---Sample liners 4---"O" rings 1---Disposable knockout tip 1---50# sack of granular bentonite

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS	**REVIEWED BY:** M. Dallas
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: L. O. Amos	**SIGNATURE:** M. Dallas **DATE:** 3-7-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin falling head activities in boring #C8759.		DATE: 03-08-13
LOCATION: "SX" Tank Farm 200 W. Area Hanford	EXCAVATION: DAN-13-0036 U-DIG # 12285707	REPORT #: 39
START CARD NO. SE47030	DECOMMISSION NO. AE20137	RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2. N/A 3. N/A 4. N/A	SITE/EQUIPMENT INSPECTION: (Yes) No	HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8759 Tubing (2 1/2") @ 126.5' to 123' ft bgs; S.U. 3.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Flammable Liquid Fires.**
0640	Travel to MO 563 for P.O.D.
0710	Onsite at MO 563. Standby for P.O.D.
0835	P.O.D. was held by R. Franzen FWS WRPS.
0850	"ACE" under RWP CO-762 Rev. 3 at MO 563.
0900	Inspect and warm HHU XL. No problems noted.
0935	Back-pull 2.5" casing in boring #C8759 from 126.5' BGS to 123.0' BGS. Granular bentonite was added as casing was removed.
0955	Installed 1 ¼" PVC well with screen and sump.
1030	Began falling head testing activities.
1100	Lunch.
1130	Continued falling head testing activities.
1310	Secured site and travelled to office. Completed paperwork and timecard.
1430	End of shift.
------	NOTE: Falling head testing activities were left running over the weekend.

N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup, Simpson* *NCO: Villarreal, Snook, Sharp* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 54 F, mostly sunny with winds from the southwest at 5-10 mph.** **DOWNTIME: 1 Hr. and 25 minutes for P.O.D.**	**DISCARDED ITEMS:** 5---Gallons of distilled water.

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L. O. Amos

REVIEWED BY:
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 3-8-13

10/06/09 Rev 1

ENERGY SOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue falling head testing activities in boring #C8759.		**DATE: 03-11-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 40**

START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2. N/A 3. N/A 4. N/A	**SITE/EQUIPMENT INSPECTION:** (Yes) No	*HHU CAT #2* *HHU CAT #4* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8759 *Tubing* (2.5") *@* 126.5' *to* GS *ft bgs; S.U.* N/A

Borehole # N/A *Tubing* ( ) *@* *to* *ft bgs S.U.*

Borehole # N/A *Tubing* ( ) *@* *to* *ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Defensive Driving.**
0640	Travel to MO 563 for P.O.D.
0730	Onsite at MO 563. Standby for P.O.D.
0845	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3
0955	Inspect and warm HHU XL. No problems noted.
1015	It was discovered that the 1 ¼" PVC well, screen and sump lengths were off. Tubing was 9.7' in length, not 10.0'. Well was pulled.
1100	Lunch.
1130	Standby for IH Technician to back-pull and decommission boring #C8759.
1230	Back-pulled 2.5" casing from 126.0' BGS to GS while adding granular bentonite.
1450	Travelled to office. Completed paperwork and timecard.
1530	End of shift.
	N/A.

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup, Simpson* *NCO: Villarreal, Snook, Sharp* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 62 F, mostly cloudy with winds from the south southwest at 5-15 mph.** **DOWNTIME: 1 Hr.---IH Technician and 1 Hr. 10 minutes for P.O.D.**	**DISCARDED ITEMS:** 7---50# bags of bentonite.

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS	**REVIEWED BY:** M. WEAKLEY
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: LO Amos	**SIGNATURE:** M. Weakley **DATE:** 3-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin falling head testing activities in boring #C8761.

DATE: 03-12-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 41

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole #C8761 Tubing (2.5") @ 152.6' to 127.1' ft bgs; S.U. 3.2'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Emergency Warning Devices.**
0645	Travel to MO 563 for P.O.D.
0715	Onsite at MO 563. Standby for P.O.D.
0800	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3
0815	Inspect and warm HHU XL. No problems noted.
0820	Move HHU XL and support equipment to boring #C8761 and set-up.
0835	Back-pulled 2.5" casing from 152.0' BGS to 129.7' BGS. expendable tip was knocked out. Granular bentonite was added as casing was back-pulled.
0855	Ran inner string and dummy tip in boring and reamed open the knock-out tip holder. Inner string and dummy tip were pulled.
0950	10-20 mesh sand was added from 129.7' BGS to 129.2' BGS. 1 ¼" O.D. PVC well with sump and screen was installed in preparation
------	for falling head testing. 2.5" casing was back-pulled from 129.2' BGS to 127.1' BGS to expose PVC well screen.
------	NOTE: See attached asbuilt for depth installation of materials.
1100	Lunch.
1130	R. Simpson onsite to begin falling head testing. Installed transducer in borehole. Falling head testing was initiated. 3 gallons of water
------	Was used for two tests. Transducer was left in borehole and testing ran overnight.
1421	Secured site and travelled to office. Completed paperwork and timecard.
1530	End of shift.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup, Simpson
NCO: Villarreal, Snook, Sharp
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 64 F, mostly cloudy with winds from the south southwest at 10-20 mph.

DOWNTIME: 45 minutes for P.O.D.

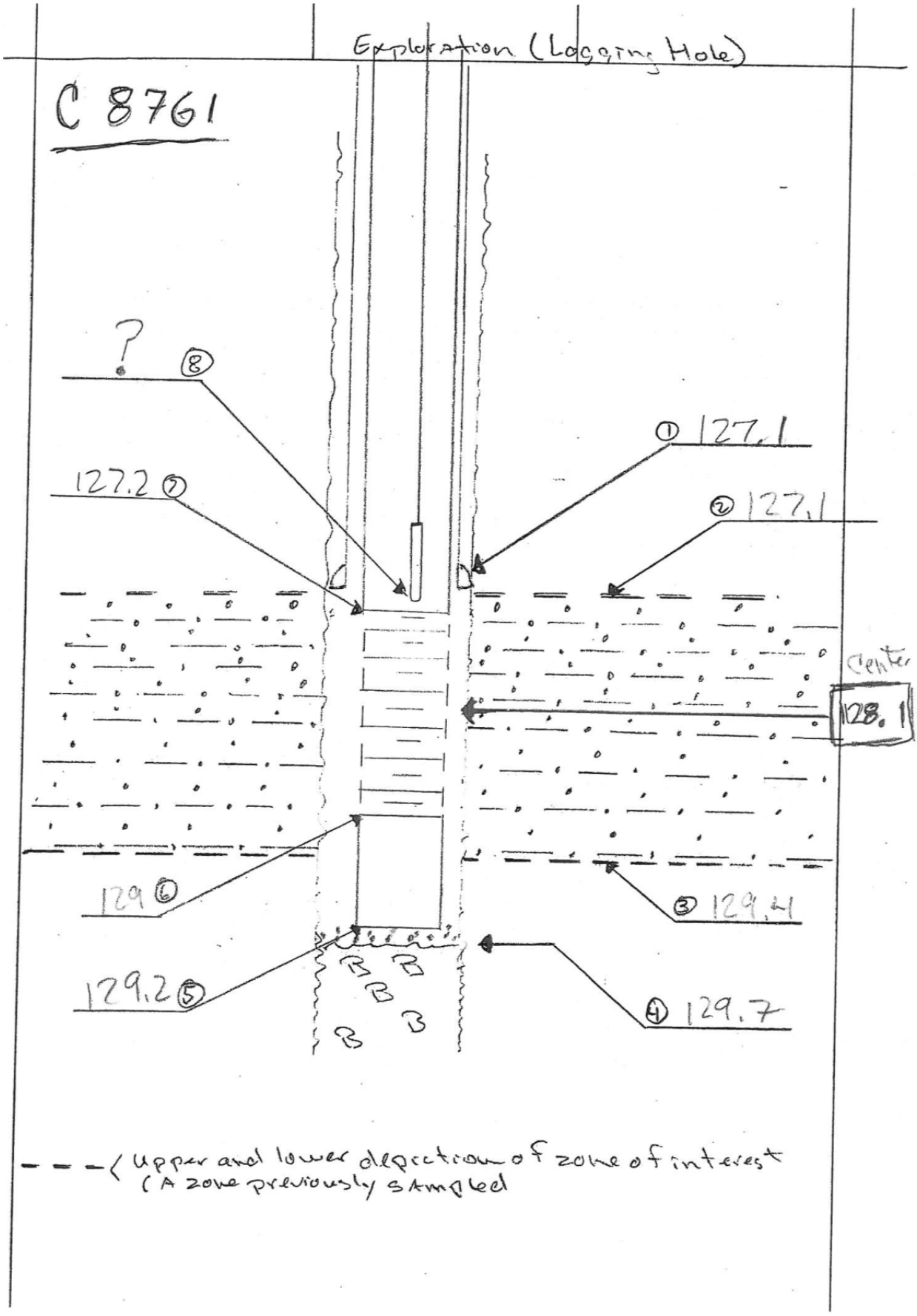
DISCARDED ITEMS:
1---50# sack of bentonite
3---Gallons of distilled water

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: L O Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O Amos

REVIEWED BY:
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE:
DATE: 3-13-13

10/06/09 Rev 1


Exploration (Logging Hole)
C 8761
?
⑧
① 127.1
127.2 ⑦
② 127.1
Center
128.1
129 ⑥
③ 129.4
129.2 ⑤
④ 129.7
Upper and lower depiction of zone of interest
(A zone previously sampled

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue falling head testing activities in boring #C8761.		**DATE: 03-13-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 42**
START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2. N/A 3. N/A 4. N/A	**SITE/EQUIPMENT INSPECTION:** (Yes) No	*HHU CAT #2 HHU CAT #4 (HHUXL#3)*
	BOREHOLE SUMMARY *Borehole # C8761 Tubing (2.5") @ 127.1' to N/A ft bgs; S.U. 3.2'* *Borehole # N/A Tubing ( ) @ to ft bgs S.U.* *Borehole # N/A Tubing ( ) @ to ft bgs; S.U.*	**GEOPHYSICAL LOGGING** *Boring # Interval Type* *1.N/A* *2 N/A* *3 N/A*

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: The Intersection Problem**
0625	Travel to MO 563 for P.O.D.
0705	Onsite at MO 563. Standby for P.O.D.
0800	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3
0825	R. Simpson and ESGG crew continuing falling head testing in borehole. 1 ¼" PVC well screen was surged and bailed.
------	Tagged bottom of well at 129.2' before surging. Surged for 15 minutes. Retagged bottom of well at 129.3' BGS after surging.
------	Began bailing well to remove the remaining water and sediment from the previous test.
1105	Lunch.
1135	Continued bailing of well. Unable to remove the last 5.75' of water due to the sediment lodging in the bottom of the bailer.
------	Decision was made at the ESGG office to add ½ gallon of water to try and dilute the sediment. Well was then bailed down to a
------	depth of 0.174' of water remaining in the well sump.
1400	Falling head activities were continued with the addition of 2 gallons of water. Transducer was placed in well and testing will
------	continue overnight.
1415	Secured site and travelled to office. Completed paperwork and timecard.
1530	End of shift.

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup, Simpson* *NCO: Villarreal, Snook* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 68 F, partly cloudy with winds from the southwest at 5-10 mph.** **DOWNTIME: 25 minutes for P.O.D.**	**DISCARDED ITEMS:** 2 ½---Gallons of water. 13---Disposable bailers.

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-NW-DOW-001 ECN-12-001421

REPORT BY: LO AMOS	**REVIEWED BY:** M. Walkup
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE:	**SIGNATURE:** **DATE:** 3-13-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue falling head testing activities in boring #C8761. **DATE: 03-14-13**

LOCATION: "SX" Tank Farm 200 W. Area Hanford | **EXCAVATION: DAN-13-0036** U-DIG # 12285707 | **REPORT #: 43**

START CARD NO. SE47030 | **DECOMMISSION NO. AE20137** | **RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8761 Tubing (3.5") @ 102.1' to N/A ft bgs; S.U. 5.2'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Distracted & Dozing.**
0640	Travel to MO 563 for P.O.D.
0710	Onsite at MO 563. Standby for P.O.D.
0800	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3
0825	1 ¼" PVC well screen was surged twice for 15 minutes both times. 1 ¼" PVC well was bailed twice. One gallon of water was added
------	to dilute sediment in well to accommodate bailing activities. Well was bailed down to a depth of 0.394' in bottom of well sump.
1054	Initiated falling head activities. 2 gallons of water was added. Transducer was left in well and testing will continue over the weekend.
1100	Lunch.
1130	Secured site for the weekend. Travelled to office. Completed paperwork and timecard.
1530	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley, Walkup, Simpson
NCO: Villarreal, Snook
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 69 F, mostly cloudy with winds from the southwest at 10-15 mph.

DOWNTIME: 50 minutes for P.O.D.

DISCARDED ITEMS:
3---Gallons of water.

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-W-DOW-001 ECN-12-001421

REPORT BY: L O Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O Amos

REVIEWED BY: M. Weakley
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 3-18-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Complete Falling Head Test in C8761, DATE: 3-18-13

LOCATION: SX Tank Farm, Hanford EXCAVATION: DAW-13-0636 U-DIG #: 122857O7 REPORT #: 44

START CARD NO. SE47030 DECOMMISSION NO. AF 20137 RWP: CO 762 R.3 AHA- GG-Nuc*-R01858

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2.
3.
4.

SITE/EQUIPMENT INSPECTION: (Yes) No HHU CASE#1 HHU CAT #2 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U. ____
Borehole # _____ Tubing ( ) @ to ft bgs; S.U. ____
Borehole # _____ Tubing ( ) @ to ft bgs; S.U. ____

GEOPHYSICAL LOGGING

Boring # Interval Type

1. N/A
2.
3.

TIME	WORK SUMMARY
0600	Safety MTG at office. Topic-Training & Experience
0645	Travel to mo 563 for POD, Swing by and pickup bentonite
0730	onsite at mo 563, standby for POD
0800	POD was held by R. Franzen FWS WRPS and direction was given to go Ace in at The Aces station.
0845	Back at mo 563, waiting for OK to pull inner rodon C8762 (could be a wind issue) IH on site to pull Air sample
0900	Got OK to pull inner Rod on C8762. Head to site, warm up rig. Move rig to C8762.
0930	Pull inner rod out of C8762
1000	Inner Rod out, clean up rods and get ready to run Falling head test on C8761.
1030	IH is pulling Air Sample on C8762. Begin Surging and bailing activities on C8761.
1130	water is bailed out of hole, set transducer, add 2 gallons of water, and start Falling head test
1200	Lunch (Tranducer will stay in C8761 until morning.
1230	Head to equipment trailer and unload bentonite.
1300	Head to office (standby for head test.
1530	End shift
	N/A

OPERATOR/LICENSE: Amos 1224
ES SUPPORT: Weakley, walkup, Simpson
NCO: Villarreal, Snook
HPT: Clayton, Mincey
FWS: Franzen

WEATHER: 49 F mostly clear winds 15-25 mph

DOWNTIME: .5 POD ~~3.5 - Falling head test~~

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120, GG-W-DOE-001, ECN-12-001421

REPORT BY: Olin Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M. Walkup
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. Walkup DATE: 3-19-13

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Complete falling head testing activities in boring #C8761 and begin decommissioning.		**DATE: 03-19-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 45**

START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY	**SITE/EQUIPMENT INSPECTION: (Yes) No**	***HHU CAT #2 HHU CAT #4 (HHUXL#3)***

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

BOREHOLE SUMMARY

Borehole # C8762 Tubing (2 1/8") @ 129.0' to GS ft bgs; S.U. N/A

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Right & Left Turns.**
0650	Travel to MO 563 for P.O.D.
0720	Onsite at MO 563. Standby for P.O.D.
0800	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3
0840	Inspected and warmed HHU XL. No problems noted.
0855	Back-pulled 2.5" casing from sample boring #C8762 and decommissioned from 129.0' BGS to GS while adding granular bentonite.
1100	Lunch.
1130	Added ¾ of a gallon of water to boring #C8761 and surged for 15 minutes. Bailed to 0.01' in bottom of well sump.
1233	Falling head testing was initiated with the addition of 2 gallons of water. Transducer was left in well and testing will run overnight.
1245	Secured site. Travelled to office. Completed paperwork and timecard.
1530	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup* *NCO: Villarreal, Snook* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 56 F, mostly cloudy with winds from the northwest at 5-10 mph.** **DOWNTIME: 40 minutes for P.O.D.**	**DISCARDED ITEMS:** 9---50# bags of bentonite

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-W-DOW-001 ECN-12-001421

REPORT BY: Olin Amos	**REVIEWED BY:** M. D. Walkup
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: Olin Amos	**SIGNATURE:** M. D. Walkup **DATE:** 03-20-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Pull 1 ¼" PVC well and decommission boring #C8761		**DATE: 03-20-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 46**

START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2. N/A 3. N/A 4. N/A	**SITE/EQUIPMENT INSPECTION: (Yes) No**	*HHU CAT #2 HHU CAT #4 (HHUXL#3)*

BOREHOLE SUMMARY

Borehole #C8761 Tubing (2½") @127.1 to 125.1 ft bgs; S.U. 1.3'

Borehole #C8760 Tubing (3½") @127.2 to N/A ft bgs S.U. 2.3'

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Flashing Yellow.**
0640	Travel to MO 563 for P.O.D.
0710	Onsite at MO 563. Standby for P.O.D.
0815	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3
0835	Inspect and warm HHU XL. No problems noted.
0845	Back-pulled 2.5" casing in boring #C8761 from 127.1' BGS to 125.1' BGS to accommodate access to 1 ¼" PVC well. Removed
------	1 ¼" PVC well from boring. Tagged DTB at 129.5' BGS. Per WRPS boring #C8761 was not decommissioned.
0900	Mobilized HHU XL and support equipment to sample boring #C8760 and set-up.
0912	Pulled inner string from boring to accommodate WRPS IH Technicians in obtaining filtered air sample.
0935	WRPS IH Technicians obtained filtered air sample from ~120.0' BGS. Readings were ~3.3 ppm.
1015	ESGG crew on standby pending the decision by WRPS on the decommissioning of sample boring #C8760.
1100	Lunch.
1130	ESGG crew on standby pending the decision by WRPS on the decommissioning of sample boring #C8760.
------	Travelled to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224 ***ES SUPPORT: Weakley, Walkup*** ***NCO: Villarreal, Snook*** ***HPT: Clayton, Mincy*** ***FWS: Franzen***	**WEATHER: 58 F, mostly cloudy with rain showers. Winds from the southwest at 15-25 mph.** **DOWNTIME: 1 Hr. 5 minutes for P.O.D. and 4 Hrs. and 45 minutes for decision from WRPS on decommissioning.**	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-W-DOW-001 ECN-12-001421

REPORT BY: Olin Amos	**REVIEWED BY:** [illegible]
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: Olin Amos	**SIGNATURE:** [illegible] **DATE:** 03-21-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Standby for decision from WRPS on the decommissioning of sample boring #C8760.		**DATE: 03-21-13**
LOCATION: "SX" Tank Farm 200 W. Area Hanford	**EXCAVATION: DAN-13-0036** **U-DIG # 12285707**	**REPORT #: 47**

START CARD NO. SE47030	**DECOMMISSION NO. AE20137**	**RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858**
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2. N/A 3. N/A 4. N/A	**SITE/EQUIPMENT INSPECTION:** *Yes* (No)	*HHU CAT #2 HHU CAT #4* (*HHUXL#3*)

BOREHOLE SUMMARY

Borehole # C8760 *Tubing* (2 5/8") @ 127.6' *to* N/A *ft bgs; S.U.* 2.3

Borehole # N/A *Tubing* ( ) @ *to* *ft bgs S.U.*

Borehole # N/A *Tubing* ( ) @ *to* *ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Law & Condition Dictate Top Speed.**
0640	Travel to MO 563 for P.O.D.
0710	Onsite at MO 563. Standby for P.O.D.
0815	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3.
0845	Standby for decision from WRPS on the decommissioning of sample boring #C8760.
1100	Lunch.
1130	Standby for decision from WRPS on the decommissioning of sample boring #C8760.
------	Travelled to office. Completed paperwork and timecard.
1530	End of shift.

N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT: Weakley, Walkup* *NCO: Villarreal, Snook* *HPT: Clayton, Mincy* *FWS: Franzen*	**WEATHER: 52 F, mostly cloudy with winds from the south southwest at 10-20 mph.** **DOWNTIME: 9 Hrs. waiting on decision from WRPS.**	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-W-DOW-001 ECN-12-001421

REPORT BY: L O Amos	**REVIEWED BY:** M. D. Wheeler
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: L O Amos	**SIGNATURE:** M. D. Wheeler DATE: 03-25-13

10/06/09 Rev 1

200 FT MULTI LEVEL RESISTIVITY PROBE WORK SHEET BOREHOLE NO: C8761

DIMENSIONS	PRELIMINARY AS-BUILT	CONSTRUCTION MATERIAL/TAG	
PLANNED	ACTUAL	MATERIAL	TAG
0 ft		SURFACE PROTECTION @ 1 FT BGS	
- 20 ft -	- ft -	Bentonite from ____ to ____ Sand from ____ to ____ D.E. from ____ to ____ Sand from ____ to ____	
- 40 ft -	- ft -	Bentonite from ____ to ____ Sand from ____ to ____ D.E. from ____ to ____ Sand from ____ to ____	
- 60 ft -	- ft - 2	Bentonite from ____ to ____ Sand from ____ to ____ D.E. from ____ to ____ Sand from ____ to ____	
- 80 ft -	18 - ft - 2	Bentonite from ____ to ____ Sand from ____ to ____ D.E. from ____ to ____ Sand from ____ to ____	
- 100 ft -	18 2 - ft -	Bentonite from ____ to ____ Sand from ____ to ____ D.E. from ____ to ____ Sand from ____ to ____	
- 120 ft -	18 - ft - 2	Bentonite from ____ to ____ Sand from ____ to ____ D.E. from ____ to ____ Sand from ____ to ____	✓
- 140 ft -	18 - ft - 88 → 2	Bentonite from 0 to 85 Sand from 85 to 85.5 D.E. from 85.5 to 88.5 Sand from 88.5 to 89	✓ ✓
- 160 ft -	18 - ft - 108 → 2'	Bentonite from 89 to 105 Sand from 105 to 105.5 D.E. from 105.5 to 108.5 Sand from 108.5 to 109	✓ ✓
- 180 ft -	17.5 - ft - 127 1.5	Bentonite from 109 to 124.5 Sand from 124.5 to 125 D.E. from 125 to 127.5 Sand from ~~128.5~~ 127.5 to 128	✓ ✓

NOTE 1: Resistivity Probe measurements are to the bottom of the probe

ENERGY SOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Decommission sample boring #C8760.

DATE: 03-26-13

LOCATION: "SX" Tank Farm 200 W. Area Hanford

EXCAVATION: DAN-13-0036
U-DIG # 12285707

REPORT #: 49

START CARD NO. SE47030

DECOMMISSION NO. AE20137

RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: *Yes No*

HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # C8760 *Tubing (* 2 5/8" *@* 22.6' *to* 0 *ft bgs; S.U.* 0

Borehole # N/A *Tubing ( ) @ to ft bgs S.U.*

Borehole # N/A *Tubing ( ) @ to ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	*Interval*	*Type*
1. N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Driving In Bad Weather.**
0630	Travel to MO 563 for P.O.D. ; Pick up bentonite
0730	Onsite at MO 563. Standby for P.O.D.
0820	P.O.D. was held by R. Franzen FWS WRPS and "ACE" under RWP CO-762 Rev. 3.
0835	Inspect and warm HHU XL. No problems noted. Mobilize to exploratory boring #C8760 and set-up.
0858	Pull 2 5/8" pipe
1020	Pipe out of hole, fold over rig and get ready for RCT's to survey.
1100	Lunch
1130	RCT is ~~surveying~~ Surveying rig out of RBT, and equipment
1200	Head to yard, Survey will take the rest of the day
1500	Head to office
1530	End shift
	NOTE: IH was monitoring while decommissioning.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Weakley
NCO: Villarreal, Snook
HPT: Clayton, Mincy
FWS: Franzen

WEATHER: 61 F, partly cloudy with winds from the northwest at 5-10 mph.

DOWNTIME:
1hr. Support
4hr. Survey Rig out

DISCARDED ITEMS:
8-Bags Bentonite

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-W-DOW-001 ECN-12-001421

REPORT BY: LO Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O. Amos

REVIEWED BY: D.W Wallace
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 03-27-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Demob. HHU XL from farm to ENW.		DATE: 03-27-13
LOCATION: "SX" Tank Farm 200 W. Area Hanford	EXCAVATION: DAN-13-0036 U-DIG # 12285707	REPORT #: 50
START CARD NO. SE47030	DECOMMISSION NO. AE20137	RWP: CO-762 Rev.3 JHA-GG-NWOP-RO-1858
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2. N/A 3. N/A 4. N/A	SITE/EQUIPMENT INSPECTION: (Yes) No BOREHOLE SUMMARY Borehole # _____ Tubing ( ) @ to ft bgs; S.U. Borehole # _____ Tubing ( ) @ to ft bgs S.U. Borehole # _____ Tubing ( ) @ to ft bgs; S.U.	HHU CAT #2 HHU CAT #4 (HHUXL#3) GEOPHYSICAL LOGGING Boring # Interval Type 1.N/A 2 N/A 3 N/A

N/A

TIME	WORK SUMMARY
0600	**Safety meeting at office. Topic: Avoiding Electrical shocks.**
0845	Travelled from "C" Tank Farm to "SX" Tank Farm with Powers Equipment. Loaded and transported HHU XL to ESGG yard at ENW.
------	NCO's and Teamsters loaded support equipment into cargo and transported to "C" Tank Farm.
1030	End of project. Completed paperwork and timecard at office.

N/A

OPERATOR/LICENSE: Ehrgott/3115 ES SUPPORT: Weakley NCO: Villarreal, Snook HPT: Clayton, Mincy FWS: Franzen	WEATHER: 64 F, partly cloudy with winds from the northwest at 5-10 mph. DOWNTIME: N/A	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-12-6120 GG-W-DOW-001 ECN-12-001421

REPORT BY: MIKE EHRGOTT TITLE : ES TECHNICAL PREPARER SIGNATURE: Mike Ehrgott	REVIEWED BY: M. W. WALKER TITLE: ES TECHNICAL REVIEWER SIGNATURE: _____ DATE: 4-18-13

10/06/09 Rev I

This page intentionally left blank.

APPENDIX D

GEOPHYSICAL LOGGING IN THE 241-SX TANK FARM

This page intentionally left blank.

Geophysical Logging in the 241-SX Tank Farm

by

Russ Randall, PhD

to

Energy*Solutions*
Richland, Washington 99354

March 2013

Three Rivers Scientific
3740 Grant Loop
West Richland, Washington 99353

Geophysical Logging in the 241-SX Tank Farm

1 Introduction

Energy*Solutions* (ES) and Three Rivers Scientific provided small diameter (slim hole) logging in support of field activities at the 241-SX Tank Farm. Logging surveys were conducted with three detectors: BGO, LaBr (both scintillation) and a neutron-neutron moisture tool. The surveys assisted in the identification of zones for sample collection and laboratory analysis, and vapor extraction tests. This report includes the results of these surveys for the two probeholes installed at the investigation site (see Appendix A).

The BGO and LaBr instruments were run in combination during the logging run, and spectral data were recorded for both. The energy resolution of the LaBr is superior to the BGO, but the BGO efficiency for KUT naturals is superior to the LaBr. Thus, the data from the BGO were used to measure gross gamma and concentrations of KUT, and the LaBr data was used to identify and measure the concentrations of selected radionuclides. The targeted radionuclide for this project was ^{137}Cs.

Both of the gamma tools were calibrated for the probehole conditions present at the investigation site. The moisture tool was calibrated to both 6 and 8 inch-cased calibration standards. A casing thickness correction was applied to the extrapolated casing diameter calibrations for the moisture response.

2 Survey Results

Log surveys were recorded from the bottom of the probehole (maximum survey depth) to the ground surface. Zero depth reference is at ground surface. A daily repeat measurement was acquired to verify instrument repeatability. The main log and repeat intervals are presented on the same plot. The computed results of the main and repeat intervals were reviewed and the results agree within the uncertainty of the measurement counting statistics.

The survey results for each probehole are presented as a depth versus concentration plot in Appendix A.

3 Geophysical Logging System

The logging system is a portable unit powered by either on-site generator (120v AC), or site-supplied power. A laptop computer allocated to the logging unit is used to monitor encoder depth positions, control the winch motor, and record detector responses.

3.1 Gross Gamma Calibration and Surveys

The gross gamma is obtained using the efficiency superior BGO instrument response. The settings of the detector components are fixed (i.e. set up during assembly, prior to calibration) and are not adjustable by the field-logging engineer. The detector gain and lower threshold are set to record gamma ray activity with energies between 20 and 3000 keV. By comparison, the highest gamma ray from naturally occurring radionuclides is from thorium-232 and occurs at 2614 keV. A natural thorite mineral containing ^{232}Th and ^{238}U is used as a field verifier at the beginning and ending of each day's logging activities to check detector resolution (integrity) and energy calibration (amplifier gain).

The BGO detector was calibrated in gross gamma borehole calibration models located at the U.S. DOE Hanford site near Richland, Washington. Calibration data were collected in the two most appropriate (lowest concentration) gross gamma calibration zones (SBA and SBU). The detector was covered with a 4-ft long section of the direct push casing (0.37-inch thick). The calibration data are summarized in Table 1. The calibration units are pCi/g of equivalent Radium-226 (eRa-226). See Appendix B for the calibration certificate.

Table 1. Gross Gamma Calibration Data

Calibration Model	Concentration eRa-226 (pCi/g)	Dead-Time Corrected Gross Gamma Count-Rate[1] (cps)
SBA	61.2	2517±2
SBU	186	7347±3.5

Count rates are mean of 50 sample measurements at 10-sec each.
[1] BGO Detector system dead time is 7.2 microsec

The BGO/LaBr gamma surveys were logged at 0.5 ft depth increments and 100 seconds per station. A spectrum of 1024 channels was collected each 0.5 feet from the bottom of the probehole to the surface. The spectra were recorded in comma-delimited format with all spectra per file. Detector count rates were dead-time corrected and the gamma survey data were processed as gross gamma response to determine the concentration of equivalent Radium-226 (eRa-226) in pCi/g.

The dead time correction is a nonparalyzeable relationship (Knoll, 1979) and described by the following equation:

$$C_t = \frac{C_{obs}}{1 - \varepsilon \cdot C_{obs}}$$

Where:

C_t = the true or dead time corrected count rate in c/s
C_{obs} = the observed count rate in c/s
ε = the dead time factor of 7.2 μs.

3.2 Spectral Gamma Calibrations and Surveys

Calibration of the BGO logging system was performed in the four spectral gamma borehole calibration models located at the U.S. DOE Hanford Site near Richland, Washington and according to Hanford Site procedures for scintillation type spectral gamma ray borehole detectors (Randall & Stromswold, 1995). The four calibration models contain elevated concentrations of the naturally occurring radionuclides (potassium, uranium or radium in secular equilibrium with uranium, and thorium, aka KUT). The radionuclide concentrations are traceable to NIST standards (Steele & George, 1986). Table 2 lists the radionuclide concentration in each of the gamma calibration models. The uncertainty is quoted at the 2-sigma (95%) confidence level.

Table 2. Hanford calibration model values for KUT

Model	^{40}K Concentration (pCi/g)	^{226}Ra Concentration (pCi/g)	^{232}Th Concentration (pCi/g)
SBK	53.50 ± 1.67	1.16 ± 0.11	0.11 ± 0.02
SBU	10.72 ± 0.84	190.52 ± 5.81	0.66 ± 0.06
SBT	10.63 ± 1.34	10.02 ± 0.48	58.11 ± 1.44
SBM	41.78 ± 1.84	125.79 ± 4.00	39.12 ± 1.07

The calibration was performed with a section of the direct push casing (4-ft long) 0.37-in. thick (2.5-in. OD) installed over the detector (4-in. long). Performing the calibration inside the casing is more rigorous than performing the calibration in an open hole and applying a correction factor to account for the presence of the direct push casing.

During logging, the gamma peak at 1461 keV from potassium (K-40) is almost always present as the dominant peak in each spectra. The second best peak is the 2614 keV peak from ^{232}Th. Both of these peaks are used to monitor for spectra gain changes. During data processing the spectra gain is adjusted to track the reference gamma peaks.

Borehole survey spectra (100 seconds each) were measured each 0.5 feet between the selected depth intervals in move-stop-acquire logging mode. The results are presented on the plot for each of the corresponding probeholes.

3.3 Spectral Photo Peak Calibrations and Surveys

The LaBr spectral data are processed differently than the BGO data, and thus the LaBr calibration is different. The LaBr calibration is performed in the same manner that the HPGe log data are calibrated (Randall, 1994). The basic concept involves the non-linear least square fitting of a linear background plus a Gaussian photo peak over a small region of the spectra containing the target gamma ray. The discussion in this report will cover the target gamma ray of ^{137}Cs (661 keV), but the same technique can be applied to any other gamma ray.

The SBU calibration model was used to measure the LaBr detector efficiency for the 609 keV peak from a daughter product of ^{238}U. The gamma ray detection efficiency of LaBr is a function of energy, thus a method of correcting the measured efficiency at 609 to the efficiency at 661 keV was developed. MCNP (RSICC) code for making Monte Carlo gamma transport calculations was used to compute the ratio of detector efficiencies between 609 and 661 keV. This ratio was then applied to the measure efficiency at 609 keV to obtain the ^{137}Cs gamma ray efficiency. The tool geometry of the modeling was the same used in the SBU calibration, and the source was set to both a 609 and 661 keV distributed throughout an SBU matrix.

The dead time for the LaBr instrument was measured to be 1.06 µs. The measured detector efficiency for the 661 keV is 0.588 (c/s)/pCi/g (Appendix B contains the calibration certificate). The measured FWHM% for the ^{137}Cs photo peak is 4.17% at 661 keV.

The log data processing for ^{137}Cs was performed using a MathCad®file. The steps to process the data are the following:

1. The energy calibration is established.
2. Based upon the 661 keV energy, the predicted peak channel is computed from the energy calibration.
3. A MathCad file is used to fit a linear background plus a Gaussian (with the energy computed centroid, and established peak width) to each spectral record.
4. Within the same MathCad file, the photo peak count rate is computed, the dead time corrected, the calibration coefficients are applied, and the ^{137}Cs concentrations and depths are output to a comma delimited file.
5. Survey plots are made with only those computed ^{137}Cs that are above minimum detect levels, which is conservatively set at 0.7 pCi/g, based upon the statistical merits of the fitting.

4 Conclusion

Scintillation gross, spectral gamma, and moisture survey logs were collected in two probeholes installed in the 241-SX Tank Farm. All probeholes were pushed to their target depth, one planned push was aborted because of refusal to advance; thus leaving only two pushed boreholes to log. Both probeholes were pushed to approximately 150 feet in depth.

No ^{137}Cs, above the minimum detect level, was identified in the two probeholes logged. Thusthe ^{137}Cs plot tracks are blank; refer to the plots in Appendix A.

5 References

Knoll, G. 1979, "Radiation Detection and Measurement," Copyright 1979 by John Wiley & Sons, Inc., ISBN "0-471-49545-X."

Randall, Russel R. PhD and Stromswold, David C. PhD, 1995, "Procedures for Calibrating Scintillation Gamma-Ray Well Logging Tools Using Hanford Formation Models," Westinghouse Hanford Co., Richland, WA.

Steele, W. Douglas and George, David C., 1986, "Field Calibration Facilities for Environmental Measurement of Radium, Thorium, and Potassium," Bendix Field Engineering Corp., Grand Junction, CO.

Randall, Russel R.,1994, "Calibration of the Radionuclide Logging System Germanium Detector," Westinghouse Hanford Co., Richland, WA

RSICC Computer Code Collection, MCNP4B2, "Monte Carlo N-Particle Transport Code System," Transport Methods Group Los Alamos National Lab, Los Alamos, New Mexico, distributed by Oak Ridge National Lab.

Appendix A

Gamma Survey Results

Gross gamma, KUT spectral, ^{137}Cs, and moisture responses are shown in the following survey plots for the two probeholes installed in the 241-SX Tank Farm. All detector count rates were dead-time corrected and the results were converted using the calibration coefficients. The plots, with header information, follow.

SX-Farm C8759 Header Information

Small Diameter –Moisture Survey

Probehole:	C8759	Log Date:	Feb 2013
Project:	SX Farm	Depth Ref:	Ground
Surface			

Repeat/Overlap Intervals

Gamma:	142-147	Moisture:
50-56		
	135-140	
	44-49	

Observations

Gamma:

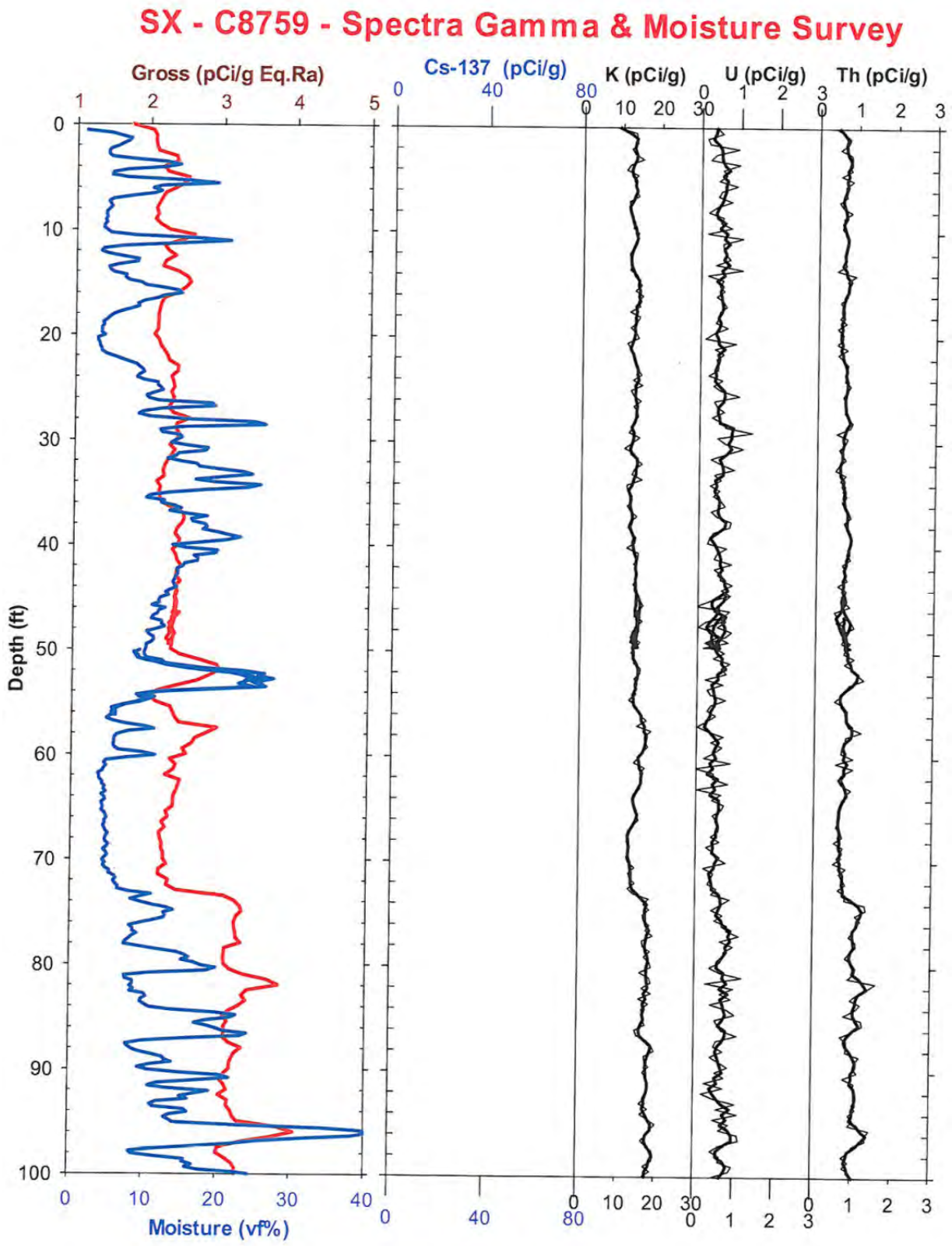
Cs-137 is not observed in this probe hole.

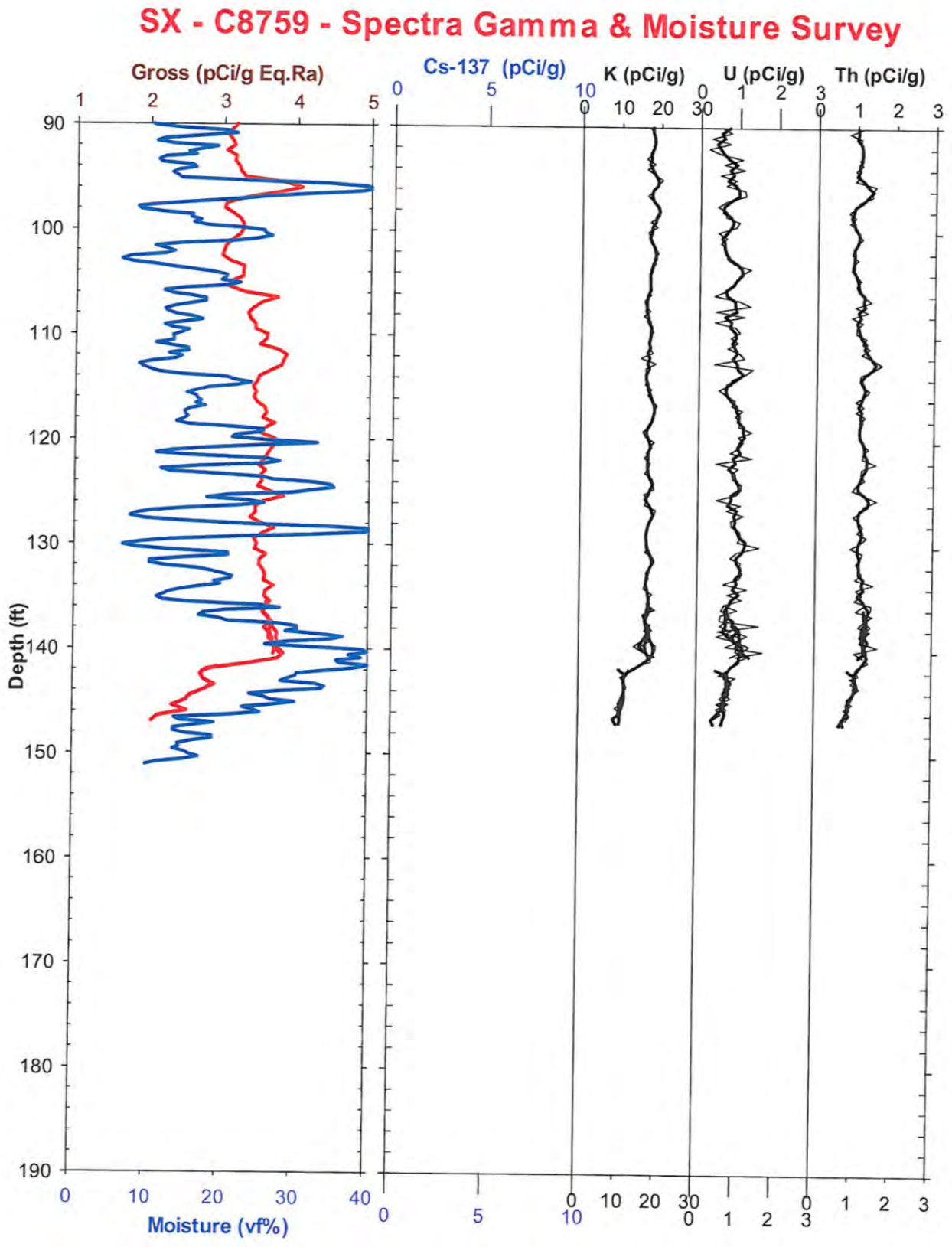
Moisture:

Moisture values range from 3-42%. There are numerous thin bed responses throughout the entire logged interval.

Calibration Certificates

Moisture	
Date:	Jan 25, 2013
Electronic File:	N2_097_2013-v0.zip
Gamma BGO	
Date:	Feb 4, 2013
Electronic File:	BGO-1_2013-v0.zip


SX - C8759 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)


SX - C8759 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)

SX-Farm C8761 Header Information

Small Diameter –Moisture Survey

Probehole:	C8761	Log Date:	Feb 2013
Project:	SX Farm	Depth Ref:	Ground
Surface			

Repeat/Overlap Intervals

Gamma: 142-147
151-146

79-76

113-108

Moisture:

Observations

Gamma:

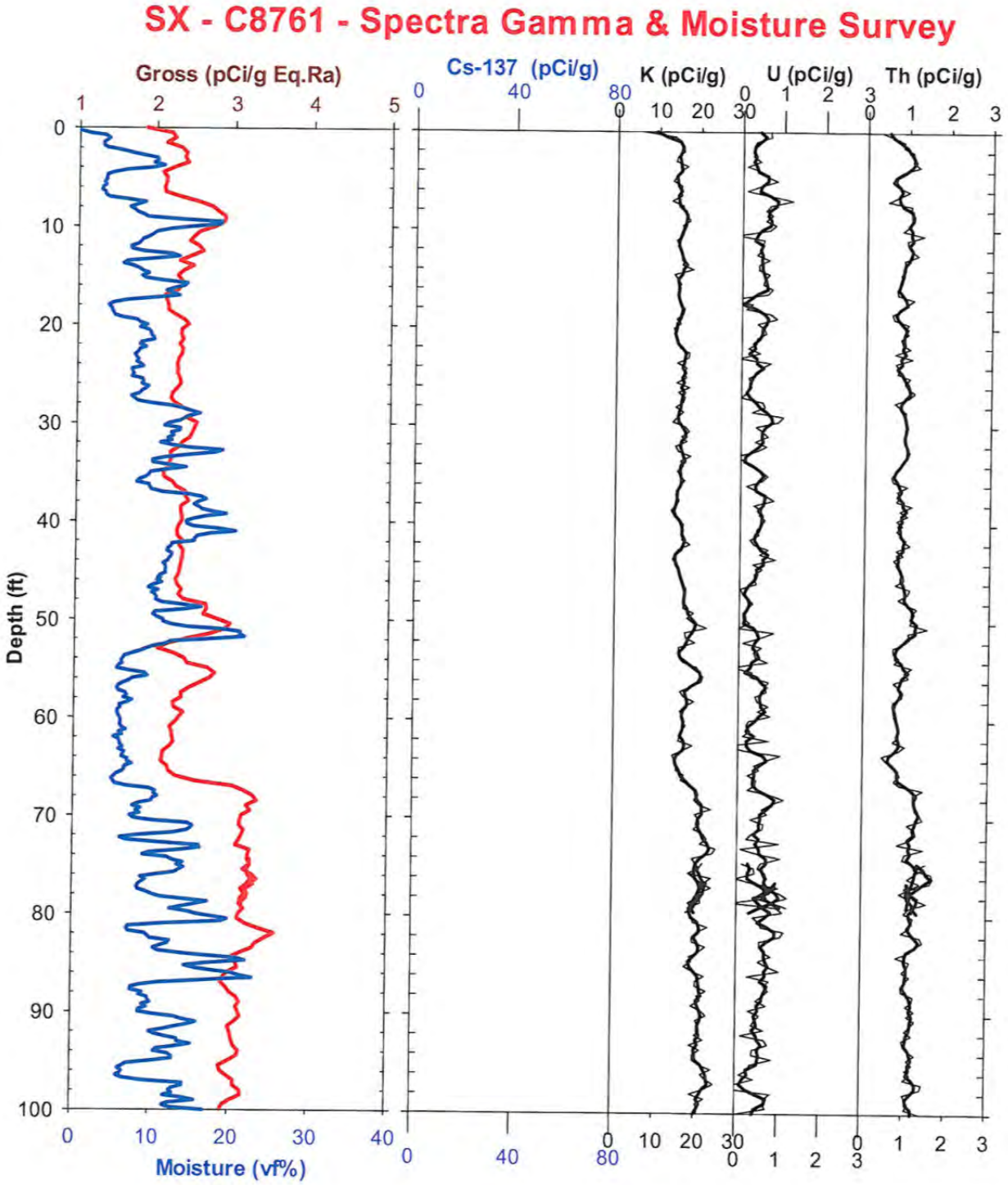
Cs-137 is not observed in this probe hole.

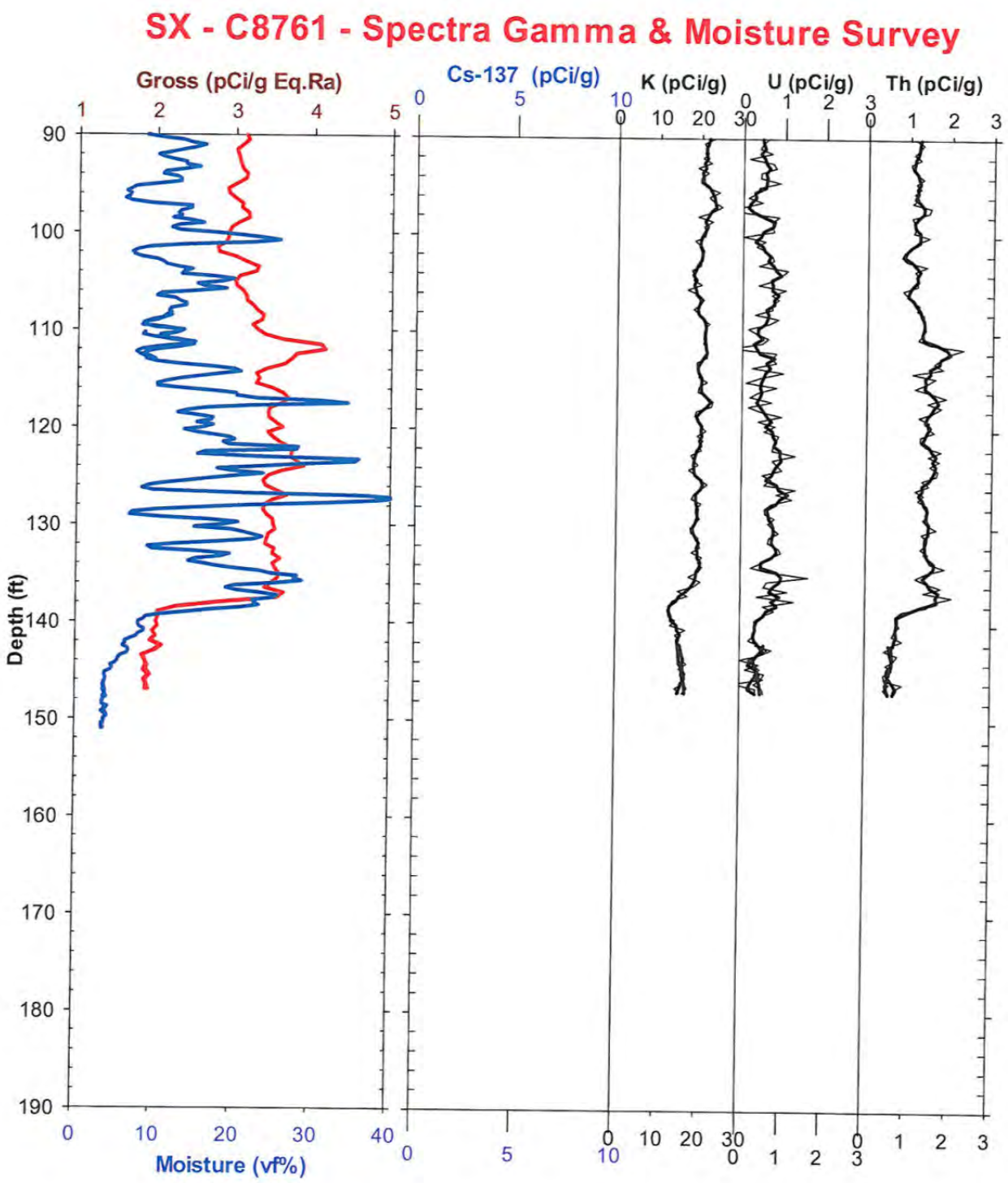
Moisture:

Moisture values range from 3-42%. There are numerous thin bed responses throughout the entire logged interval.

Calibration Certificates

Moisture	
Date:	Jan 25, 2013
Electronic File:	N2_097_2013-v0.zip
Gamma BGO	
Date:	Feb 4, 2013
Electronic File:	BGO-1_2013-v0.zip


SX - C8761 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)


SX - C8761 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)

Appendix B

Calibration Certificates

The following pages contain the following calibration certificates:

1. BGO gross gamma
2. BGO KUT spectral
3. LaBr Cs-137 spectral
4. Neutron-neutron moisture
5. Moisture calibration extrapolated to direct push casing size

Certificate of Calibration
BGO-1
Feb 4, 2013

Data were taken at the Hanford KUT models on Feb 4, 2013. BGO-1 is the designated Scintillator tool. The SBA model was used for the gross gamma calibration. Fifty spectra were recorded for the model in order to perform statistical analysis. The observed deviations were seen to be near the theoretically predicted variation; refer to the files compressed: Stats.xls for this analysis.

The instrument was covered with 0.37 inch wall-thickness direct push casing.

The coefficient analysis is determined by the algorithm described in the document WHC-SD-EN-TI-293, Rev. 0. The gross gamma calibration for equivalent ^{226}Ra in pCi/g is a regression function and is generally defined by:

$$Ra = a*GR + b$$

Where Ra is the Eq. ^{226}Ra in pCi/g, and GR is the observed gross gamma count rate (c/s), dead time corrected. The coefficients of a & b are the fit coefficients. A more physical relationship constrains the intercept (b) to a zero value. This computation yields improved response extrapolated to low concentrations of K, U, and Th (clean zones). The coefficients were determined to be:

$$a = .0243 \quad \text{Eq.}^{226}\text{Ra pCi/g / (c/s)}$$
$$b \equiv 0$$
$$\text{at energy threshold of 0keV}$$

$$a = .194 \quad \text{Eq.}^{226}\text{Ra pCi/g / (c/s)}$$
$$b \equiv 0$$
$$\text{at energy threshold of 800keV}$$

Digital files condensed as Cal_SD-GR-2_2010-v0.zip. This compressed file contains:

- Calibration raw data
- Spreadsheet data formatting

The undersigned certifies that the data archived in the file "Cal_BGO-1_2013-v0.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-293, "Procedures for Calibrating Scintillation Gamma-Ray Well Logging Tools Using Hanford Formation Models" **and that the above stated calibration coefficients are correct and** applicable for the tool BGO-1 effective Feb 4, 2013.

Signature: _____ Date: Feb 5, 2013
Russel Randall PhD

Company: Three Rivers Scientific

Certificate of Calibration
BGO-1
Feb 4, 2013

Data were taken at the Hanford KUT models on Feb 4, 2013. BGO-1 is the designated Scintillator tool. Four models were used for Spectral KUT calibration. Fifty spectra were recorded for each model in order to perform statistical analysis. The observed statistical deviations were seen to be within the theoretically predicted variation, refer to the files compressed: Stats.XLS for this analysis. The instrument was covered with 0.37 inch wall thickness direct push casing.

The algorithm described in the document WHC-SD-EN-TI-293, Rev. 0, determines the coefficient analysis. Three energy windows are used for each potassium, uranium and thorium (K U & T), and these are:

K: 1320-1575 keV **U: 1650-2390 keV** **T: 2475-2765 keV**

The concentration for each of the three elements is a linear combination of the count rates in the three windows. The resulting coefficients for each of the three elements are:

Concentration-K =	**4.077*K**	**-3.382*U**	**2.957*T**
Concentration-U =	**0.0*K**	**1.351*U**	**-2.585*T**
Concentration-T =	**0.0*K**	**-0.034*U**	**1.655*T**

Where K U & T are the count rates (c/s) in the listed energy windows and the resulting concentration values are in pCi/g.

Digital files condensed as Cal_BGO-1_2013-v0.zip. This compressed file contains:

- Calibration raw data
- MathCad data analysis files
- Spreadsheet data formatting

The undersigned certifies that the data archived in the file "Cal_BGO-1_2013-v0.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-293, "Procedures for Calibrating Scintillation Gamma-Ray Well Logging Tools Using Hanford Formation Models" **and that the above stated calibration coefficients are correct and** applicable for the tool BGO-1 effective Feb 4, 2013.

Signature: _____ Date: Feb 5, 2013
Russel Randall PhD

Company: Three Rivers Scientific

Certificate of Calibration
LaBr-1
Cs-137 Photo Peak

Sep 13, 2012

Data were taken at the Hanford KUT models on Sep 13, 2012. LaBr-1 is the designated Scintillator tool. The SBA and SBU models were used for the gross gamma calibration. Ten spectra were recorded for each model in order to perform statistical analysis. The observed deviations were seen to be near the theoretically predicted variation, refer to the files compressed: Stats.xls for this analysis.

The instrument was covered with 0.33 inch wall-thicknessdirect push casing.

The coefficient analysis is determined by the algorithm described in the document WHC-SD-EN-TI-292, Rev. 0. The photo peak stripping method of radionuclide calibration is generally defined by:

$$C = A/(\varepsilon * N)$$

Where C is the radionuclide concentration in pCi/g, A is the deadtime corrected photo peak count rate, ε is the detector efficiency, and N is the number of gamma rays emitted per decay. The coefficient ε is the fit coefficient. The LaBr scintillator has superior energy resolution, but internal to the crystal a small but observable radioactivity that produces a background. This background does not affect the photo peak stripping method. The coefficient was determined to be:

$$\varepsilon = .588 \quad (c/s) \ / \ pCi/g$$

Digital files condensed as Cal_ES-Cs-1_2012-v0.zip. This compressed file contains:

- Calibration raw data
- Spreadsheet data formatting
- MCNP output
- Mathcad files

The undersigned certifies that the data archived in the file "Cal_ES-Cs-1_2012-v0.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-292, "Calibration of the Radionuclide Logging System Germanium Detector" and that the above stated calibration coefficient is correct and applicable for the tool LaBr-1 effective Sep 13, 2012.

Signature: _____ Date: Sep 16, 2012

Russel Randall PhD

Company: Three Rivers Scientific

Certificate of Calibration for
Instrument N-2_097

Jan 25, 2013

Data were taken in the Moisture models on Jan 25, 2013 for N-2_097 neutron-neutron moisture tool. The neutron source from DOE moisture tool ID of 78-1097 was used with the passive neutron detector probe from PNG.

Six models were used for moisture calibration, 3 for 6"casing and 3 for 8" casing. Repeated spectra were recorded for each model in order to perform statistical analysis. The observed statistical variation agreed with the theoretically predicted variation; refer to the file Stats.xls for this analysis.

The coefficient generation is determined by the algorithm described in the document WHC-SD-EN-TI-306, Rev. 0. The regression function used is a power law form and defined by:

$$V = a \cdot CR^{\alpha}$$

Where V is the formation moisture content in volume fraction water in vf units. One vf unit is 1% by volume water. The coefficients a and α are fit coefficients, and CR is the deadtime corrected observed total count rate, (c/s).

6" casing	8" casing
a = .0001671	a = .00009656
α = 2.202	α = 2.44

The undersigned certifies that the data archived in data file "N-2_097_2013.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-306, "Radionuclide Logging System In Situ Vadose Zone Moisture Measurement Calibration" and that the above stated calibration coefficients are correct and applicable for tool N-2_097, effective Jan 25, 2013.

Signature: Date:

Jan 30, 2013

Russel Randall, PhD
Three Rivers Scientific

Moisture Calibration Extrapolation to 2.5 Inch Borehole
Instrument N-2_097

Jan 25, 2013

Moisture calibration was performed in the Hanford physical models. These standards have 6 and 8 inch ID casings. The Tank Farm Direct Push borehole is cased with a 2.5 inch OD iron casing. The calibration for the moisture response is a function of borehole diameter.

The coefficient generation is determined by the algorithm described in the document WHC-SD-EN-TI-306, Rev. 0. The regression function used is a power law form and defined by:

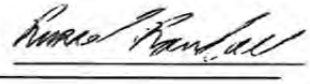
$$V = a \cdot CR^{\alpha}$$

Where V is the formation moisture content in volume fraction water in vf units. One vf unit is 1% by volume water. The coefficients a and α are fit coefficients, and CR is the deadtime corrected observed total count rate, (c/s). A linear extrapolation was applied to determine the 2.5 inch borehole diameter.

2.51" borehole
a = .0002184
α = 2.00

The undersigned certifies that the analysis files are archived in the file "N-2_097_2013.zip" was evaluated in accordance with Energy Solutions procedures and that the above stated calibration coefficients are correct and applicable for tool N-2_097, effective Jan 25, 2013.

Signature: Date:



Jan 30, 2013

Russel Randall, PhD
Three Rivers Scientific

This page intentionally left blank.

APPENDIX E

SAMPLE DETERMINATION MEETING MINUTES

This page intentionally left blank.

Meeting Minutes
SX Pore-water Test – Location C8760 Sample Depths
February 12, 2013

Attendees: Melissa Holm, Les Fort, Ann Shrum, Harold Sydnor, Mike Barnes, Kent Reynolds, Cindy Tabor, Joe Caggiano, Susan Eberlein, Dan Parker, Maria Skorska, Mike Truex, Mart Oostrum, and RD Hildebrand

Locations Discussed: C8760

Outcome: All Sample Depths identified below were agreed upon by attendees

Summary Information:

Support Information Provided/Discussed Help Determine Soil Sample Depths:

- Location Map of Current and Prior Direct Push Efforts
- C8759 Draft and Process Gamma and Moisture Plots
- Prior Direct Push - Gamma and Moisture Plots
- Prior Direct Push – Analytical Results
- Information from Well 299-W23-19 (SW of Tank 115)

Log Info:

- Gross Gamma Count (counts/second) – Indicates Geologic Change (In general, the lower the count the courser the grain and the higher the count the finer the grain)
- Neutron Moisture Count (counts/second) – Moisture Range (Processed Logs 5-40% moisture)

Prior Investigations:

- C7169 approx. 140 ft and C7167 approx. 96ft away from location of interest (locations are approx. 11 ft difference in surface elevation 664-666 ft amsl)
  - C7169/C7170 highest nitrate concentration of 990 µg/g was at 113-115 ft bgs (approx. at 104 ft bgs at C8759)
  - C7167/C7168 highest nitrate concentration of 1,950 µg/g was at 129-131 ft bgs (approx. at 117 ft bgs at C8759)
- 299-W23-19 highest nitrate concentration 24,000 mg/L at 130 ft bgs (approx. 120 ft bgs at C8759)

General Discussion:

- Two Sample Depths of 104 – 106 and 122.5 – 124.5 ft bgs were recommended
  - 104 – 106 ft bgs had an estimated moisture content per volume of 22% (less than what PNNL recommended) – so this sample depth was eliminated as a choice
- A deeper interval of 140 ft bgs was brought up in discussion; however, higher known contamination at the 123 interval seemed more promising – so focus was continued on the 123 ft bgs interval
- In the end, it was determine that the 123 interval was most promising and that characterizing the area above and below this interval would gain valuable information for test design (Thus, 3 samples back to back: 121 – 127 ft bgs).

Table 1: Sample Depth for C8760

Location Log Hole/Sample Hole	**Sample Depth (ft bgs)**	**Reason**
C8759/C8760	121 – 127 (3 consecutive sample intervals)	• Cold Creek upper (PPLu) - uniform grain size above and finer grain below a higher moisture interval • 35% moisture (within PNNLs criteria): 122.5 – 122.4 ft bgs • Similar zone to C7168 and 299-W23-19 where higher nitrate and Tc-99 concentrations have occurred

Stratigraphic info
Higher moisture per Processed Log (highest moisture is 40%)
Historical Information

Meeting Minutes
SX Pore Water Extraction Test (T2C17) – Location C8762 Sample Depths
February 21, 2013

Attendees: Melissa Holm, Les Fort, Harold Sydnor, Mike Barnes, Kent Reynolds, Cindy Tabor, Susan Eberlein, Dan Parker, Mike Truex, Marcel Bergeron, Jacob Throolin, Becky Wiegman, and RD Hildebrand

Locations Discussed: C8762

Outcome: All Sample Depths identified below were agreed upon by attendees

Summary Information:

Support Information Provided/Discussed Help Determine Soil Sample Depths:

- Location Map of Current and Prior Direct Push Efforts
- C8759 and C8761 Gamma and Moisture Plots
- Prior Direct Push - Gamma and Moisture Plots
- Prior Direct Push – Analytical Results
- Information from Well 299-W23-19 (SW of Tank 115)

Prior Investigations:

- C7167 approx. 95 ft away from location of interest, C8761 (locations are approx. 11 ft difference in surface elevation 664-666 ft amsl)
  - C7167/C7168 highest nitrate concentration of 1,950 µg/g was at 129-131 ft bgs (approx. at 117 ft bgs at C8761)
- 299-W23-19 highest nitrate concentration 24,000 mg/L at 130 ft bgs (approx. 120 ft bgs at C8759)

Table 1: Sample Depth for C8762

Location Log Hole/Sample Hole	**Sample Depth (ft bgs)**	**Reason**
C8761/C8762	123 – 129 (3 consecutive sample intervals)	• Cold Creek upper (PPLu) - uniform grain size above and below higher moisture intervals • Highest moisture peaks overall 30 – 40 % (within PNNLs criteria) • Similar zone to where higher nitrate and Tc-99 concentrations have occurred

Stratigraphic info
Higher moisture per Processed Log (highest moisture is 40%)
Historical Information

APPENDIX F

SAMPLING AUTHORIZATION AND CHAIN OF CUSTODY FORMS

This page intentionally left blank.

Washington River Protection Solutions
SAMPLING AUTHORIZATION FORM

SAF NUM V13-001 **SAF TITLE** Direct Push Samples for SX Pore Water Extraction Test Project **REV** 0

PROJECT	SX Tank Farm PW		
PROGRAM/PROJECT TYPE	Other Other		
OPERABLE UNIT	NONE		
REQUESTER	SHRUM, A	**CHARGE CODES**	
TASK MANAGER	TABOR, CL		
PROJECT COORDINATOR	SYDNOR, HA		
ESTIMATED START DATE	1/15/2013	**SAMPLE AREA**	200 West
ESTIMATED COMPLETION DATE	6/15/2013	**MATRIX**	SOIL
ESTIMATED NUMBER OF SAMPLES	30		
SAMPLING ORGANIZATIONS			

LABORATORY/PRICE_CODE/PRIORITY TURNAROUND/REQUIRED TURNAROUND/DATA DELIVERABLE

Primary / 222-S Lab Operations / C03 / 60 Days / 120 Days / Interim Results & Summary

SAF COMMENT

**GENERAL
The applicable FSAP is RPP-PLAN-54366. (Analytical and Quality Control information is summarized in Tables 3-1, 3-2, and 4-1).
There are 3 sampling sites and at each sampling site there will be approximately 2 vertical samples taken.

**FIELD
Material from the shoe will be put into 500 ml glass jar.
Field personnel will cap liners. When capping is not possible or the liners cannot be removed from the sampler, field personnel shall put material into a 250 ml or 500 ml glass jar.

**LABORATORY
Bulk Density will be determined for each liner, then the material from the liners and shoe (glass jar assigned to generic testing) shall be composited and analyzed. A Quick Turn sample will be analyzed for nitrate, pH, Tc-99 and conductivity on a 1:1 water digest. The nitrate and Tc-99 results will be reported on an expedited time frame (typically within one week of the last sample receipt batched together; however, upon request, results will be reported within 48 hours). The remainder of the composited material will be used for the rest of the analyses and will be reported with the pH and conductivity results in the final analysis report.

The final data package should be in Format VI with QA verification.

222S will transmit all COCs to IDMS.

SAF REVISION COMMENT

COC COMMENT

After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited.

Washington River Protection Solutions
SAMPLING AUTHORIZATION FORM

SAF NUM V13-001 **SAF TITLE** Direct Push Samples for SX Pore Water Extraction Test Project **REV** 0

Field Sampling Requirements

Laboratory: 222-S Lab Operations **Matrix: SOIL**

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
Bulk Density - D2937 (TF) Bulk density - wet	D2937_DENSITY	Liner 160 g	Full QC	Cool~6C	24 Hours
pH (Soil) - 9045 pH Measurement	9045_PH	Liner 160 g	Full QC	Cool~6C	24 Hours
ICPMS Tc-99_WE(TF) Technetium-99	RADISOTOPES_ICPMS		Minimum		6 Months
IC Anions - 9056_WE Nitrate	9056_ANIONS_IC		Minimum		48 Hours
Conductivity - 9050_WE	9050_CONDUCT		Full QC		28 Days
IC Anions - 9056 2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate	9056_ANIONS_IC		Full QC		28 Days/48 Hours
Actinides ICPMS (TF) Neptunium-237, Thorium-230, Thorium-232, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238	RADISOTOPES_ICPMS		Full QC		6 Months
RADISO_ICPMS (TF) Technetium-99, Tin-126	RADISOTOPES_ICPMS		Full QC		6 Months
Percent Solids (TF)	%SOLIDS		Full QC		None
Percent Water (TF)	D2216_%MOIS		Full QC		None
Generic Testing	SPECIAL_STUDIES	G 500 mL	Full QC	Cool~6C	24 Hours

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs* = Glass w/ septum cap- no head space in container
P = Plastic (Polyethylene)
aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs* = Amber Glass w/ septum cap- no head space in container
aG/T = Amber Glass w/ Teflon Lined Lid

DATE OF PRINT 01/15/2014 SAF STATUS Final STATUS DATE 3/20/2013 11:00:00 PAGE 2 of 2

Washington River Protection Solutions
SAMPLING AUTHORIZATION FORM

SAF NUM V13-002 **SAF TITLE** Direct Push Samples for SX Pore Water Extraction Test Project - QC Sample **REV** 0

PROJECT	SX Tank Farm PW		
PROGRAM/PROJECT TYPE	Other Other		
OPERABLE UNIT	NONE		
REQUESTER	MCKINNEY, SG	**CHARGE CODES**	
TASK MANAGER	TABOR, CL		
PROJECT COORDINATOR	SHRUM, A		
ESTIMATED START DATE	1/15/2013	**SAMPLE AREA**	200 West
ESTIMATED COMPLETION DATE	6/15/2013	**MATRIX**	WATER
ESTIMATED NUMBER OF SAMPLES	2		
SAMPLING ORGANIZATIONS			

LABORATORY/PRICE_CODE/PRIORITY TURNAROUND/REQUIRED TURNAROUND/DATA DELIVERABLE

Primary / 222-S Lab Operations / C03 / 60 Days / 120 Days / Interim Results & Summary

SAF COMMENT

**GENERAL
The applicable FSAP is RPP-PLAN-54366. (Analytical and Quality Control information is summarized in Tables 3-1, 3-2, and 4-1).

**FIELD
These Equipment Rinsate Blanks and Field Blanks will be taken for every 20 soil sample or as otherwise directed

**LABORATORY
222S will transmit all COCs to IDMS.

SAF REVISION COMMENT

COC COMMENT

DATE OF PRINT 01/15/2014 SAF STATUS Final STATUS DATE 3/21/2013 11:00:00 PAGE 1 of 2

Washington River Protection Solutions
SAMPLING AUTHORIZATION FORM

SAF NUM V13-002 **SAF TITLE** Direct Push Samples for SX Pore Water Extraction Test Project - QC Sample **REV** 0

Field Sampling Requirements

Laboratory: 222-S Lab Operations **Matrix: WATER**

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
RADISO_ICPMS (TF)	RADISOTOPES_ICPMS	G/P 500 mL	Full QC	HNO3 to pH <2	6 Months
Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238					
IC Anions - 9056	9056_ANIONS_IC	G/P 500 mL	Full QC	Cool~6C	28 Days/48 Hours

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs* = Glass w/ septum cap- no head space in container
P = Plastic (Polyethylene)
aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs* = Amber Glass w/ septum cap- no head space in container
aG/T = Amber Glass w/ Teflon Lined Lid

DATE OF PRINT 01/15/2014 SAF STATUS Final STATUS DATE 3/21/2013 11:00:00 PAGE 2 of 2

Washington River Protection Solutions
SAMPLING AUTHORIZATION FORM

SAF NUM V13-006 **SAF TITLE** SX Porewater Extraction Test Project, Stage III (Porewater and QC Samples) **REV** 0

PROJECT	SX Tank Farm PW		
PROGRAM/PROJECT TYPE	Other Other		
OPERABLE UNIT	NONE		
REQUESTER	MCKINNEY, SG	**CHARGE CODES**	
TASK MANAGER	TABOR, CL		
PROJECT COORDINATOR	SHRUM, A		
ESTIMATED START DATE	10/1/2013	**SAMPLE AREA**	200 West
ESTIMATED COMPLETION DATE	12/31/2013	**MATRIX**	WATER
ESTIMATED NUMBER OF SAMPLES	22		
SAMPLING ORGANIZATIONS			

LABORATORY/PRICE_CODE/PRIORITY TURNAROUND/REQUIRED TURNAROUND/DATA DELIVERABLE

Primary / 222-S Lab Operations / C03 / 60 Days / 120 Days / Interim Results & Summary

SAF COMMENT

**GENERAL
The applicable FSAP is RPP-PLAN-54366 (refer to Change Notice 1). Analytical Information for Stage III Porewater sampling is provided in Table 3-2 and in Change Notice 1.

**FIELD
There will be approximately two equipment rinses – one at the beginning and one and the end of the project and there will be one field blank.

**LABORATORY
222S will transmit all COCs to IDMS.

SAF REVISION COMMENT

COC COMMENT

DATE OF PRINT 01/15/2014 SAF STATUS Final STATUS DATE 10/1/2013 11:00:00 PAGE 1 of 2

Washington River Protection Solutions
SAMPLING AUTHORIZATION FORM

SAF NUM V13-006 **SAF TITLE** SX Porewater Extraction Test Project, Stage III (Porewater and QC Samples) **REV** 0

Field Sampling Requirements

Laboratory: 222-S Lab Operations **Matrix: WATER**

Parameter / Analysis	Reference Method	Container / Volume	VolReq	Preservation	Holding Times
RADISO_ICPMS (TF)	RADISOTOPES_ICPMS	G/P 500 mL	Full QC	HNO3 to pH <2	6 Months
Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238					
IC Anions - 9056	9056_ANIONS_IC	G/P 500 mL	Full QC	Cool~4C	28 Days/48 Hours
2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate					

Key to Container Types

G = Glass
Gs = Glass w/ septum cap
Gs* = Glass w/ septum cap- no head space in container
P = Plastic (Polyethylene)
aG = Amber Glass
aGs = Amber Glass w/ septum cap
aGs* = Amber Glass w/ septum cap- no head space in container
aG/T = Amber Glass w/ Teflon Lined Lid

DATE OF PRINT 01/15/2014 SAF STATUS Final STATUS DATE 10/1/2013 11:00:00 PAGE 2 of 2

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-002-002	PAGE 1 OF 1
COLLECTOR: Snock / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SHRUM, A	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 Equipment Blank	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project - QC Sample		SAF NO.: V13-002	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-04-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: N/A	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION			HNO3 to pH <2	Cool~6C		
HOLDING TIME			6 Months	28 Days/48 Hours		
TYPE OF CONTAINER			G/P	G/P		
NO. OF CONTAINER(S)			1	1		
VOLUME			500mL	500mL		
SAMPLE ANALYSIS			SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 9056;		
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2NRC3	WATER	3-6-13	0925	✓	✓	→ S13V000001
						↓ S13V000002

"EQ-BLANK" ✓✓

Temp blank 1.0 3/6/13

CRP # 20130107 mms 03/06/13
~~20130185~~

Samples S13V000001
S13V000002

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};
Scott Snock / Brook Swanson	3-6-13/1330	RT Steele ATL	3.6.13 1330	RSP 3.16.13
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	
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		TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD		DISPOSED BY	DATE/TIME

PRINTED ON 2/20/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-002-001	PAGE 1 OF 1
COLLECTOR: Snook/Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SHRUM, A	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 Field Blank	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project - QC Sample		SAF NO.: V13-002	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: N/A	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

				PRESERVATION	HNO3 to pH <2	Cool~6C
				HOLDING TIME	6 Months	28 Days/48 Hours
				TYPE OF CONTAINER	G/P	G/P
				NO. OF CONTAINER(S)	1	1
				VOLUME	500mL	500mL
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 9056;
B2NRC2	WATER	3-7-13	1009 ✓		✓	✓

Temp blank 2.7
RKStark 3.7.13
GRP# 20130167 ✓
Sam# S13V000003 ✓
S13V000004 ✓
Field Blank

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME ✓	(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};
Scott Snook/Scott Snook	3-7-13/1130	RKStark RTSteele AR	3.7.13 1130	3-7-13
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	
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		TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD		DISPOSED BY	DATE/TIME

PRINTED ON 2/20/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-001	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8760 I001	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-00000l	ACTUAL SAMPLE DEPTH: 121'-123'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	Liner
NO. OF CONTAINER(S)	1
VOLUME	160g
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

Temp: on Ice

GRP # 20130168

SAMPLE NO.		MATRIX*	SAMPLE DATE	SAMPLE TIME		
B2NPN4	A	SOIL	2-19-13	1048	✓	S13V000005
B2NPN5	B	SOIL	2-19-13	1048	✓	S13V00006
B2NPN6	C	SOIL	2-19-13	1048	✓	S13V00007

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Scott Snook / Darrell Sharp — DATE/TIME: 2.19.13 1251	RECEIVED BY/STORED IN: RTStuck RTStuck ATL — DATE/TIME: 2.19.13 1251	
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	
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: After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited. (1) Bulk Density - D2937 (TF) {Bulk density - wet};

2-19-13

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

PRINTED ON 2/6/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-002	PAGE 1 OF 1
COLLECTOR Snook / Sharp	**COMPANY CONTACT** SYDNOR, HA	**TELEPHONE NO.** 373-3967	**PROJECT COORDINATOR** SYDNOR, HA	**PRICE CODE** C03	**DATA TURNAROUND**
SAMPLING LOCATION C8760 I001	**PROJECT DESIGNATION** Direct Push Samples for SX Pore Water Extraction Test Project		**SAF NO.** V13-001	**AIR QUALITY** ☐	60 Days / 120 Days
ICE CHEST NO. TFVS-09-005	**FIELD LOGBOOK NO.** TFV2-13-00001	**ACTUAL SAMPLE DEPTH** 121' - 123'	**COA** N/A	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	**ORIGINAL**
SHIPPED TO 222-S Lab Operations	**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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	G
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	Generic Testing;

Temp: on ice

GR# 20130168

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NPN7	SOIL	2-19-13	1052	✓

513V000008

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited.
Scott Snook / [illegible]	2.19.13 1251	RT Steele RTSteele ATZ	2.19.13 1251	BCA 2-19-13
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	
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	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 2/6/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-004	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8760 I002	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 123' - 125'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	Liner
NO. OF CONTAINER(S)	1
VOLUME	160g
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NPN9	SOIL	2-27-13	1047	✓
B2NPP0	SOIL	2-27-13	1047	✓
B2NPP1	SOIL	2-27-13	1047	✓

Temp blank 15°C

GRP # 20130168 ✓

A S13V000017 ✓
B S13V000018 ✓
C S13V000019 ✓
~~Shoe S13V000020 See pg 2~~
mms 2-27-13

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Scott Snook / Scott Snook	2-27-13 1350	RTStele RTSteele 4H	2-27-13 1350
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
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

After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited. (1) Bulk Density - D2937 (TF) {Bulk density - wet};

RSP 2-27-13

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

PRINTED ON 2/6/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-005	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8760 I002	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 123' - 125'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	G
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	Generic Testing;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NPP2	SOIL	2-27-13	1057	✓

temp blank 15°C

GRP # 20130168

shoe 513V000020 ✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited.
Scott Snook / Brett Snook	2-27-13 1350	Rikkeli Ristuli 412	2.27.13 1350	2-27-13
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	
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	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 2/6/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-007	PAGE 1 OF 1
COLLECTOR: Snook / Shaw	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8760 1003	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 125' - 127'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	Liner
NO. OF CONTAINER(S)	1
VOLUME	160g
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NPP4	SOIL	2-27-13	1324	✓
B2NPP5	SOIL	2-27-13	1324	✓
B2NPP6	SOIL	2-27-13	1324	✓

Temp blank 15°C

GRP# 20130168 ✓

A S13V000029 ✓
B S13V000030 ✓
C S13V000031 ✓

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Scott Snook / Scott Shaw — DATE/TIME: 2-27-13 1350	RECEIVED BY/STORED IN: RT Steele ATL — DATE/TIME: 2.27.13 1350	
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	
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

After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited. (1) Bulk Density - D2937 (TF) {Bulk density - wet};

RT 2-27-13

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

PRINTED ON 2/6/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-008	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8760 I003	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 125' - 127'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

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 may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.**	PRESERVATION	Cool~6C
		HOLDING TIME	24 Hours
		TYPE OF CONTAINER	G
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	Generic Testing;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NPP7	SOIL	2-27-13	1327	✓

Temp blank 15°C

GAP# 20130168 ✓

Shoe S13V000032 ✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Scott Snook / Brent Sharp	DATE/TIME: 2-27-13 1350	RECEIVED BY/STORED IN: RTStark RTStark ATL	DATE/TIME: 2.27.13 1350
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
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

After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited.

RSP 2-27-13

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

PRINTED ON 2/6/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-016	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 I001	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 123' to 125'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: NM		

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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	Liner
NO. OF CONTAINER(S)	1
VOLUME	160g
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

Temp blank 1.0 3.6.13

QRP # 20130185 ✓

Sam #s S13V00004 1 ✓ Liner A
S13V00004 2 ✓ Liner B
S13V00004 3 ✓ Liner C

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NR97	SOIL	3-6-13	1305 ✓	✓
B2NR98	SOIL	3-6-13	1305 ✓	✓
B2NR99	SOIL	3-6-13	1305 ✓	✓

CHAIN OF POSSESSION	DATE/TIME	SIGN/ PRINT NAMES	DATE/TIME
RELINQUISHED BY/REMOVED FROM: Scott Snook / Scott Sharp	3-6-13 / 1330	RECEIVED BY/STORED IN: Pt Clark Pt Clark STL	3.6.13 1330 ✓
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	
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN	

SPECIAL INSTRUCTIONS: After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited. (1) Bulk Density - D2937 (TF) {Bulk density - wet};

RSQ 3-6-13

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

PRINTED ON 2/20/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-017	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 I001	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFV5-09-005	FIELD LOGBOOK NO.: TFV2-13-000001	ACTUAL SAMPLE DEPTH: 123' to 125'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	G
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	Generic Testing:

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NRB0	SOIL	3-6-13	1300	✓

Temp blank 1.0 Rtstd

GRI # 20130185
SAM# ~~S13V000045~~ Rtstd
S13V000044 mms 03/06/13
Shoe

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Scott Snook / Accept Shrd — DATE/TIME: 3-6-13/1330	RECEIVED BY/STORED IN: RTStech RTStech ATL — DATE/TIME: 3.6.13 1330	
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	
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: After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited.

RCT 3-6-13

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

PRINTED ON 2/20/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-018	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 I002	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 125'-127'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	Liner
NO. OF CONTAINER(S)	1
VOLUME	160g
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NRB1	SOIL	3-7-13	1000'	✓
B2NRB2	SOIL	3-7-13	1000'	✓
B2NRB3	SOIL	3-7-13	1000'	✓

Temp blank 2.7 pH strip 3.7.13

GRP # 20130185

SAM # S13V000052 Liner A
S13V000053 Liner B
S13V000054 Liner C

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Scott Snook / Scott Snook DATE/TIME: 3-7-13/1130	RECEIVED BY/STORED IN: RT Steele / RT Steele AHC DATE/TIME: 3.7.13 1130	
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	
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

After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited. (1) Bulk Density - D2937 (TF) {Bulk density - wet};

3-7-13

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

PRINTED ON 2/20/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-019	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 I002	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 125' - 127'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	G
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	Generic Testing;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NRB4	SOIL	3-7-13	0956 ✓	✓

Temp blank 2.7
Rtstuck 3.7.13

GFP# 20130185 ✓
Sam# 513U000055 ✓
Shoe

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM: Scott Snook / Scott Snook DATE/TIME: 3-7-13 / 1130	RECEIVED BY/STORED IN: RtClub RTSteele ATL DATE/TIME: 3.7.13 1130 ✓	After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited.
RELINQUISHED BY/REMOVED FROM: DATE/TIME:	RECEIVED BY/STORED IN: DATE/TIME:	3-7-13
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:	
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 2/20/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-020	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 I003	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 127' - 129'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	Liner
NO. OF CONTAINER(S)	1
VOLUME	160g
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NRB5	SOIL	3-7-13	1056 ✓	✓
B2NRB6	SOIL	3-7-13	1056 ✓	✓
B2NRB7	SOIL	3-7-13	1056 ✓	✓

Temp b/wlc 2.7 plotted 3.7.13

GRP # 20130185

SAM # 513V000063 Liner A
513V000064 Liner B
513V000065 Liner C

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Scott Snook / Accutrak Analytical	DATE/TIME: 3-7-13/1130	RECEIVED BY/STORED IN: RT Clark RT Steele ATL	DATE/TIME: 3.7.13 1130 ✓
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
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: After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited. (1) Bulk Density - D2937 (TF) {Bulk density - wet};

3-7-13

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

PRINTED ON 2/20/2013

A-6003-618 (REV 2)

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-001-021	PAGE 1 OF 1
COLLECTOR: Snook / Sharp	COMPANY CONTACT: SYDNOR, HA	TELEPHONE NO.: 373-3967	PROJECT COORDINATOR: SYDNOR, HA	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: C8762 I003	PROJECT DESIGNATION: Direct Push Samples for SX Pore Water Extraction Test Project		SAF NO.: V13-001	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-005	FIELD LOGBOOK NO.: TFVZ-13-000001	ACTUAL SAMPLE DEPTH: 127' - 129'	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	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 may or may 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

PRESERVATION	Cool~6C
HOLDING TIME	24 Hours
TYPE OF CONTAINER	G
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	Generic Testing;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2NRB8	SOIL	3-7-13	1051 ✓	✓

Temp blank 2.7
RLetsch 3.7.13

GEP# 20130185 ✓
Sm # S17V000066 ✓
Shoe

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: Scott Snook / Accott Awed — DATE/TIME: 3-7-13/1130	RECEIVED BY/STORED IN: RJ Steele RJSteele atz — DATE/TIME: 3.7.13 1130 ✓	
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	
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
After bulk density is determined on the liners, the material from the liners and shoe (500 ml glass jar assigned to generic testing) shall be composited.

3-7-13

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

PRINTED ON 2/20/2013

A-6003-618 (REV 2)

APPENDIX G

VADOSE ZONE FALLING HEAD TEST EVALUATION, REPORT FROM GSI (STAGES I AND II)

This page intentionally left blank.

GSI Water Solutions, Inc.

Technical Memorandum

To: Kent Reynolds, EnergySolutions Government Group

From: Kevin Lindsey, LHg

Date: 05 April 2013

Re: Vadose Zone Falling Head Test Evaluation

The goal of this technical memorandum (tech memo) is to report on GSI's conclusions from the review and evaluation of data collected from five vadose zone falling head tests conducted in a borehole near the SX Tank Farm. These falling head tests were conducted in a small diameter boring installed by EnergySolutions Government Group (EnergySolutions) staff in the vadose zone at a test site near the SX Tank Farm. The purpose of the falling head tests was to collect data describing the effectiveness of well development techniques used in these borings to break down the compacted material that accumulates on the boring walls as drill rods are pushed into the ground using hydraulic/vibratory push techniques. For the purposes of this tech memo this material is referred to as the compaction skin.

This tech memo includes a brief summary of the data GSI worked with, our interpretations of that data, and recommendations for future work. The work reported on herein was done under EnergySolutions Government Group Purchase Order #631861.

Data and Interpretations

The primary data set GSI used for this work consists of pressure data collected by a pressure logging transducer installed in the tested boring during a series of five falling head tests done between 12 March and 20 March 2013. The falling head tests were done, as noted above, to assess the success in breaking down the compaction skin that formed on the borehole wall during installation of the boring. The falling heads tests were done following instructions prepared jointly by GSI and EnergySolutions staff prior to field deployment. Attachment 1 shows the basic configuration of the boring during the tests.

The general timeline for these series of falling head tests, excerpted from EnergySolutions field notes, is summarized below.

1. ***Test 1, 12 March 2013.*** Using 1 gallon of water the boring was surged and purged for approximately 1 hour and 15 minutes. At the completion of that activity 1 gallon of

8019 W. Quinault Avenue, Suite 201 Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 www.gsiws.com

water was added to the boring at approximately 1218. At 1415 an additional 2 gallons was added to the boring and the falling head test commenced. This test ended the following morning with most of the water having drained away.

2. ***Test 2, 13 March 2013.*** After adding water to, and surging and bailing the boring for several hours test 2 commenced at approximately 1415 with the addition of 2 gallons of water. This falling head test ended at 0739 the following morning.
3. ***Test 3, 14 March 2013.*** After adding water to, and surging and bailing the boring for approximately 1.5 hours test 3 commenced at approximately 1054 with the addition of 2 gallons of water. This falling head test ended at 0707 on 18 March.
4. ***Test 4, 18 March 2013.*** After adding water to, and surging and bailing the boring for approximately 1.5 hours test 4 commenced at approximately 1054 with the addition of 2 gallons of water. This falling head test ended at 1103 the following morning.
5. ***Test 5, 19 March 2013.*** After adding water to, and surging and bailing the boring for approximately 0.75 hours test 5 commenced at approximately 1232 with the addition of 2 gallons of water. This falling head test ended the following morning.
6. Water bailed from the boring as the test progressed was observed to be progressively less turbid. Field staff reported that water dialed form the boring during Tests 4 and 5 was significantly less turbid that that bailed during Tests 1 and 2.

During each falling head test a pressure transducer was deployed in the boring to measure head changes in it as the 2 gallon slug of water drained out of the boring. The pressure transducer was programmed by field staff to record data logarithmically. Pressure transducer data was provided to GSI in digital form as a csv file downloaded from the transducer. GSI converted that csv file to an xls file for review and evaluation. Hydrographs of the data from the 5 falling head tests are included with this tech memo as Attachment 2.

Visual examination of Attachment 2 shows that during the first 100 plus seconds of each tests water levels rose. This is interpreted to show the pouring of the 2 gallon test volume into the boring. For that reason this following discussion focuses on the data collected after 100 seconds as that data is interpreted to provide the most information regarding the progress of development and the breaking down of the compaction skin coating the boring wall.

Generally, one sees that in Tests 1 and 2 water levels rose and/or were static between 100 and 500 to 600 seconds into the test. Conversely, in Tests 3, 4, and 5 water levels began to decline between 100 and 200 seconds into each test. Later in the tests both Test 1 and 2 show that the boring took in excess of 60,000 seconds to drain while in Tests 3, 4, and 5 the boring was largely drained by 10,000 to 20,000 seconds into the test.

The decline rates versus time for tests 1 through 4 are plotted on Attachment 3. This plot shows that water level decline rates per unit time were much lower (less than -0.002 feet/sec) and steady in Tests 1 and 2. Conversely, in Tests 3 and 4 the initial decline rates were much higher (up to -0.005 ft/sec) throughout the tests. Based on the visual examination of this data as portrayed on Attachments 2 and 3, development, in the form of surging and purging, is interpreted to have broken down the compaction skin between Tests 2 and 3, allowing the 2 gallon slug of water introduced into the boring to drain significantly faster. The similarities in the hydrographs for Test 3, 4, and 5 shown in Attachment 2 suggests that the development

work conducted between Tests 4 and 5 yielded little to no additional improvement in compaction skin breakdown, and that the boring was as developed as this technique could accomplish.

Additional comments and interpretations specific to each falling head test are given below.

Test 1: The hydrograph of Test 1 (Attachment 2) shows increasing water in the boring from the end of pouring in the slug (~100 sec) to approximately 225 seconds. Then the water level in the well begins to fall gradually for the duration of the test. It appears that the slug did not rapidly flush out of the screen but instead seeped out over a long time period. Average rates of change during the first, second, and third log cycles were -0.00069 ft/sec, -0.00096 ft/sec, and -0.00042 ft/sec, respectively (Table 1).

Table 1. Average Falling Head Rate of Change for each Log Cycle.

Test	*100-1000 seconds*	*1000-10000 seconds*	*10000-60000 seconds*
1	-0.00069 ft/sec	-0.00096 ft/sec	-0.00042 ft/sec
2	0.00271 ft/sec	-0.00040 ft/sec	-0.00025 ft/sec
3	-0.00289 ft/sec	-0.00193 ft/sec	Test complete
4	-0.00405 ft/sec	-0.00207ft/sec	Test complete

Using Test 1 data a Darcy's Law permeability of approximately 1.0E-8 cm^2 is estimated (Darcy, 1856; Bear, 1972). Using bulk density data provided by EnergySolutions for silty fine sands such as the boring likely penetrates, natural formation permeability estimated using the Kozeny-Carman method is approximately 3.0 to 4.0E-8 cm^2 (Carman, 1956; Saar and Manga, 1999). Comparing Test 1 estimated permeability to bulk density estimated permeability suggests that the boring compaction skin has 3 to 4 times less permeability than natural formation materials.

Test 2: The hydrograph of Test 2 (Attachment 2) shows increasing water level in the boring from the end of pouring in the slug (~100 sec) to approximately 530 seconds. Then the water level in the well begins to fall gradually for the duration of the test. It appears that the slug did not rapidly flush out of the screen but instead seeped out over a long time period. The rate of change from 800 to 60,000 seconds in Test 2 is less than the rate of change during the 2,000 to 60,000 second interval in Test 1. Average rates of change during the first, second, and third log cycles were 0.00271 ft/sec, -0.00040 ft/sec, and -0.00025 ft/sec, respectively (Table 1).

Using Test 2 data a Darcy's Law permeability of approximately 1.0E-8 cm^2 is estimated (Darcy, 1856; Bear, 1972). Using bulk density data provided by EnergySolutions for silty fine sands such as the boring likely penetrates, natural formation permeability estimated using the Kozeny-Carman method is approximately 3.0 to 4.0E-8 cm^2 (Carman, 1956; Saar and Manga, 1999). Comparing Test 2 estimated permeability to bulk density estimated permeability suggests that the boring compaction skin continued to have 3 to 4 times less permeability than natural formation materials at the conclusion of the second test.

8019 W. Quinault Avenue, Suite 201 Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 www.gsiws.com

Test 3: The hydrograph for Test 3 shows water level immediately decreasing and at a rapid rate from the end of pouring in the slug (~100 sec) to when the water level reaches approximately just above the top of the well screen at 7560 seconds. At this point the falling head test is interpreted to be complete. Rate of water level change in the boring increased rapidly between approximately 100 and 200 seconds. From approximately 400 seconds to 7560 seconds, rate of change decreased at a moderate but relatively constant rate. Average rates of change during the first and second log cycles were -0.00289 ft/sec and -0.00193ft/sec, respectively (Table 1). As noted above, the test was interpreted to be complete when the falling slug reached the bottom of the boring casing at 7560 seconds; this is before the start of the third log cycle.

Using Test 3 data a Darcy's Law permeability of approximately 3.6E-8 cm^2 is estimated (Darcy, 1856; Bear, 1972). Using bulk density data provided by EnergySolutions for silty fine sands such as the boring likely penetrates, natural formation permeability estimated using the Kozeny-Carman method is approximately 3.0 to 4.0E-8 cm^2 (Carman, 1956; Saar and Manga, 1999). Comparing Test 3 estimated permeability to bulk density estimated permeability suggests that development activities had broken down the compaction skin and that during Test 3 the boring had significant hydrologic connection with formation materials.

Test 4: The results for Test 4 are very similar to Test 3. The hydrograph for Test 4 shows water level immediately decreasing and at a rapid rate from the end of pouring in the slug (~100 sec) to when the water level reaches approximately just above the top of the well screen at 6720 seconds. At 6720 seconds Test 4 is interpreted to be complete. Rate of water level change over time in the boring increased rapidly between 100 and 150 seconds at which point it decreased less rapidly to about 350 seconds. From about 350 seconds to about 6720 seconds, rate of change decreased at a moderate but relatively constant rate. Average rates of change during the first and second log cycles were -0.00405 ft/sec and -0.00207ft/sec, respectively (Table 1). As noted above, the test was interpreted to be complete when the falling slug reached the bottom of the boring casing at 6720 seconds; this is before the start of the third log cycle.

Using Test 4 data a Darcy's Law permeability of approximately 9.8E-8 cm^2 is estimated (Darcy, 1856; Bear, 1972). Using bulk density data provided by EnergySolutions for silty fine sands such as the boring likely penetrates, natural formation permeability estimated using the Kozeny-Carman method is approximately 3.0 to 4.0E-8 cm^2 (Carman, 1956; Saar and Manga, 1999). Comparing Test 4 estimated permeability to bulk density estimated permeability shows that the formation material in the vicinity of the boring may have a relatively higher than generally estimated. Given that, development activities are interpreted to have broken down the compaction skin and that during Test 4 the boring had significant hydrologic connection with formation materials.

Test 5: The falling head data collected for Test 5 is very similar to that collected for Test 3 and 4 (Attachment 2). Given that, Test 5 is interpreted to show that further development was not necessary and no additional evaluation was done.

Conclusions and Recommendations

Conclusions: Based on the data collected during development and falling head tests conducted by EnergySolutions between 12 March and 20 March 2013, the methodology employed is interpreted to have successfully broken down the compaction skin generated during borehole advance. This data is interpreted to show that following several attempts at development using a surge and purge technique the compaction skin broke down, and with purging this material

was removed from the boring. The falling head rates and permeability estimates seen for Test 3 and 4 versus Test 1 and 2 are interpreted to show successful development.

Based on the data evaluated for this tech memo we conclude that falling head data collected during the first half hour to 1.5 hours of a test can be used to show successful development, as follows:

- In Tests 1 and 2 the first 1000 to 5000 seconds of the tests showed rising, followed by relatively static, to finally slowly decreasing water levels (Attachment 4). This is interpreted to reflect slow drainage of the boring through a relatively undisturbed (undeveloped) compaction skin.
- In Tests 3, 4, and 5 this feature is not seen.
- Instead, in these tests water level immediately begins falling within 100 seconds of it reaching its highest level. In addition, the boring is almost completely drained between 6500 to 7500 seconds (108 to 125 minutes, 2 hours or less) of the start of the test. This is much faster than was seen during Test 1 and 2 where draining was still occurring 50,000 to 60,000 seconds (833 to 1000 minutes, up to 16 hours) following the start of the test.
- We conclude that once development succeeds in breaking down the compaction skin falling head tests will show a change from the trend seen in Test 1 and 2, where water level is relatively static before it begins to fall) to that seen in Tests 3, 4, and 5 where water level begins falling from essentially the beginning of the test.

Recommendations: For future well development activities where conditions similar to those tested between 12 March and 20 March are encountered, and based on the data evaluated herein, GSI recommends the following basic method:

1. Once the borehole is ready for development, add a 2 gallon slug of water to it.
2. Leave this slug of water in the borehole for at least 12 hours. The purpose of this is to have water permeate the compaction skin to begin softening and degrading it preparatory to subsequent surge and purge development.
3. At this point begin development activities using 3 to 4 surge and purge events similar to those used in this effort. Each surge and purge would generally include:
    a. 30 minutes of surging the 2 gallons of water in the boring.
    b. Purging that water from the boring.
    c. Repeating until such time as the purge water is visibly less turbid as compared to the initial purge.
4. When the purge water is visibly less turbid conduct a falling head test.
    a. In this test one is looking to see if the slug of water stabilizes such as it did in Tests 1 and 2 or quickly begins to fall such as it did in Tests 3, 4, and 5.
5. If the slug shows the slow rise, stabilization, and slow fall seen in the first 30 minutes of Tests 1 and 2 development of the compaction skin is interpreted to be incomplete bullets 3 and 4 above should be repeated.

6. If the slug shows the rapid fall seen in the first 30 minutes of Tests 3, 4, and 5 development is interpreted to be having an effect on the compaction skin. In such a case the final recommended steps are to:
    a. Purge the well of the slug.
    b. Add a new clean slug.
    c. Conduct one 30 minute surge operation followed by purging.
    d. Add a new 2 gallon slug and conduct another falling head test.
    e. If the slug is seen to be falling at rates similar to the previous falling head test development can be interpreted to be complete.
    f. If the slug is seen to be falling at a higher rate, then repeat bullets 6a through 6f.

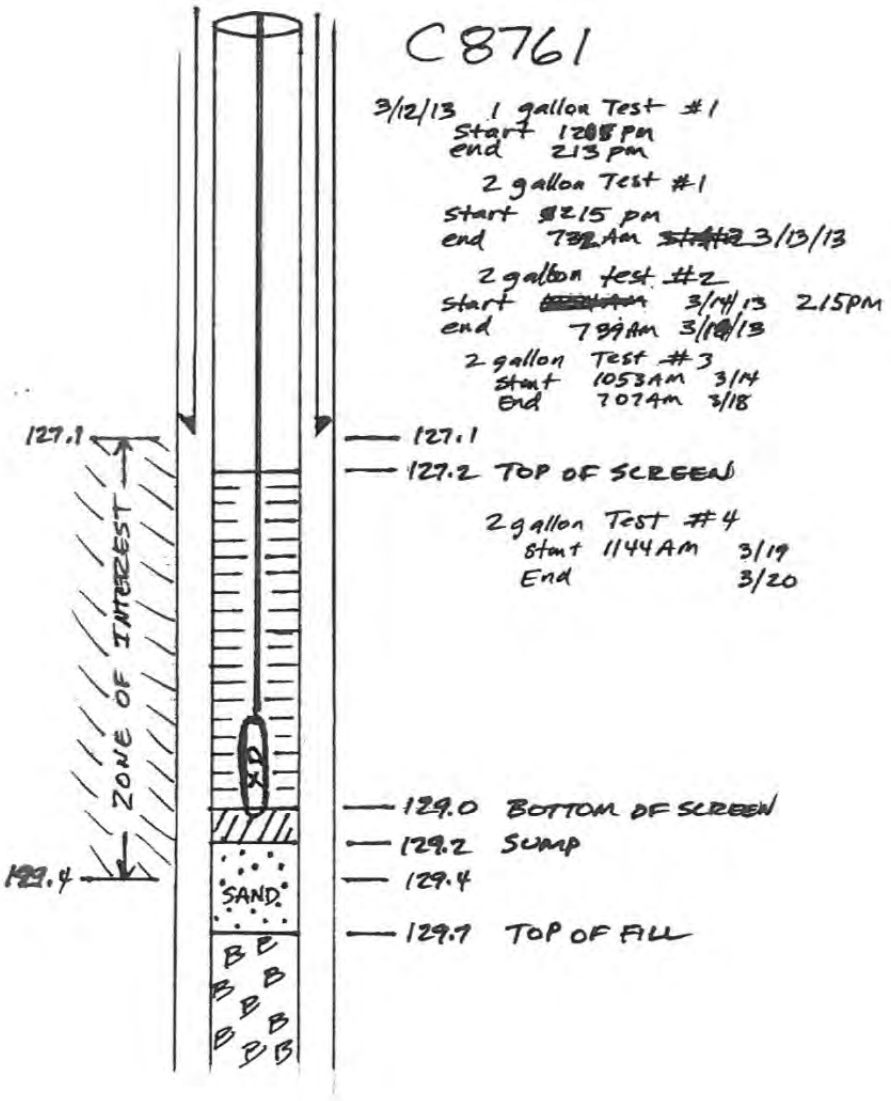
References

Bear, J., 1972, Dynamics of Fluids in Porous Media: Dover.

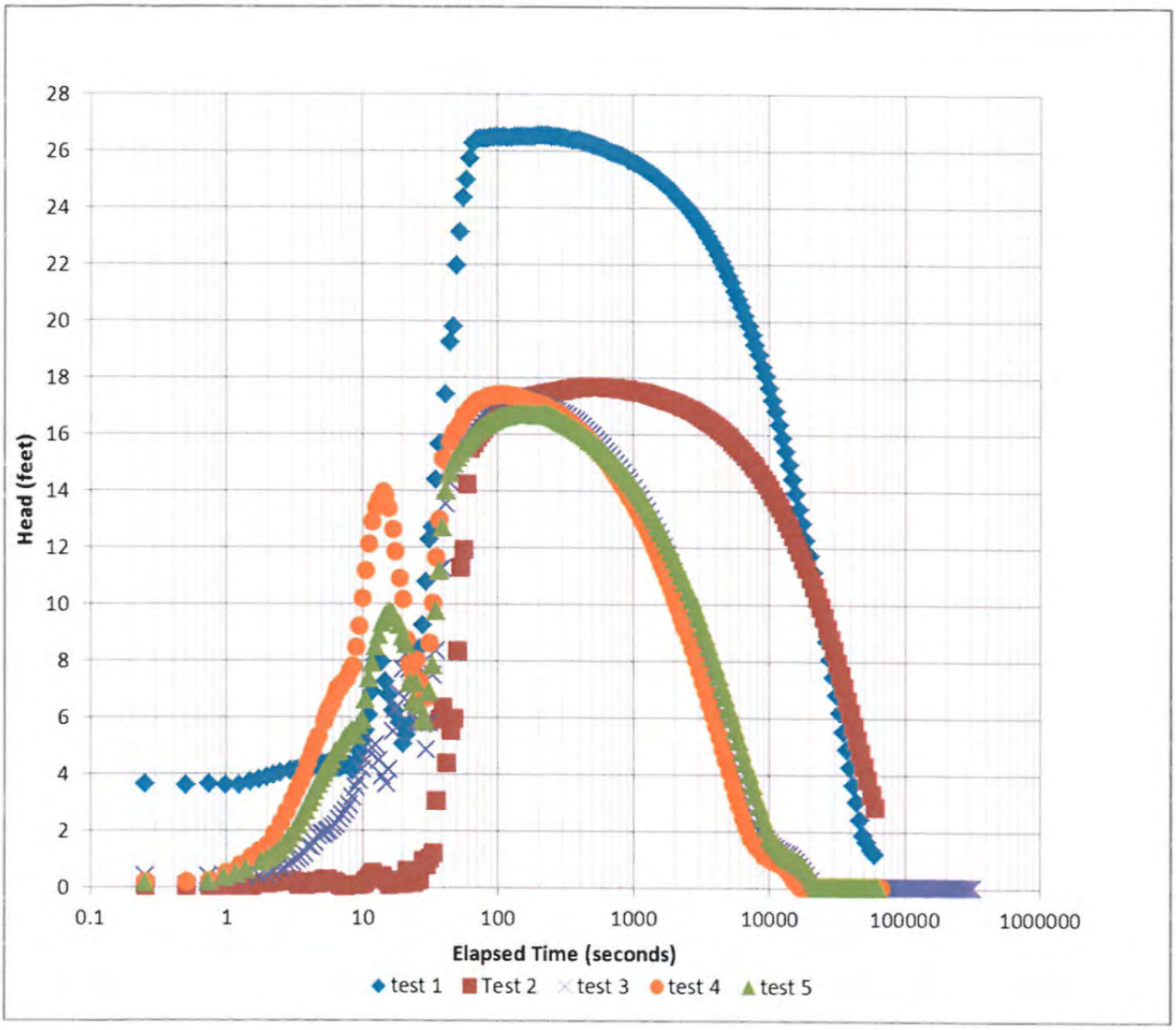
Carman, P.C., 1956, Flow of Gases Through Porous Media: Academic, San Diego, 182 pgs.

Darcy, H., 1856, Les Fontaines Publique de la Ville de Dijon: Dalmont, Paris.

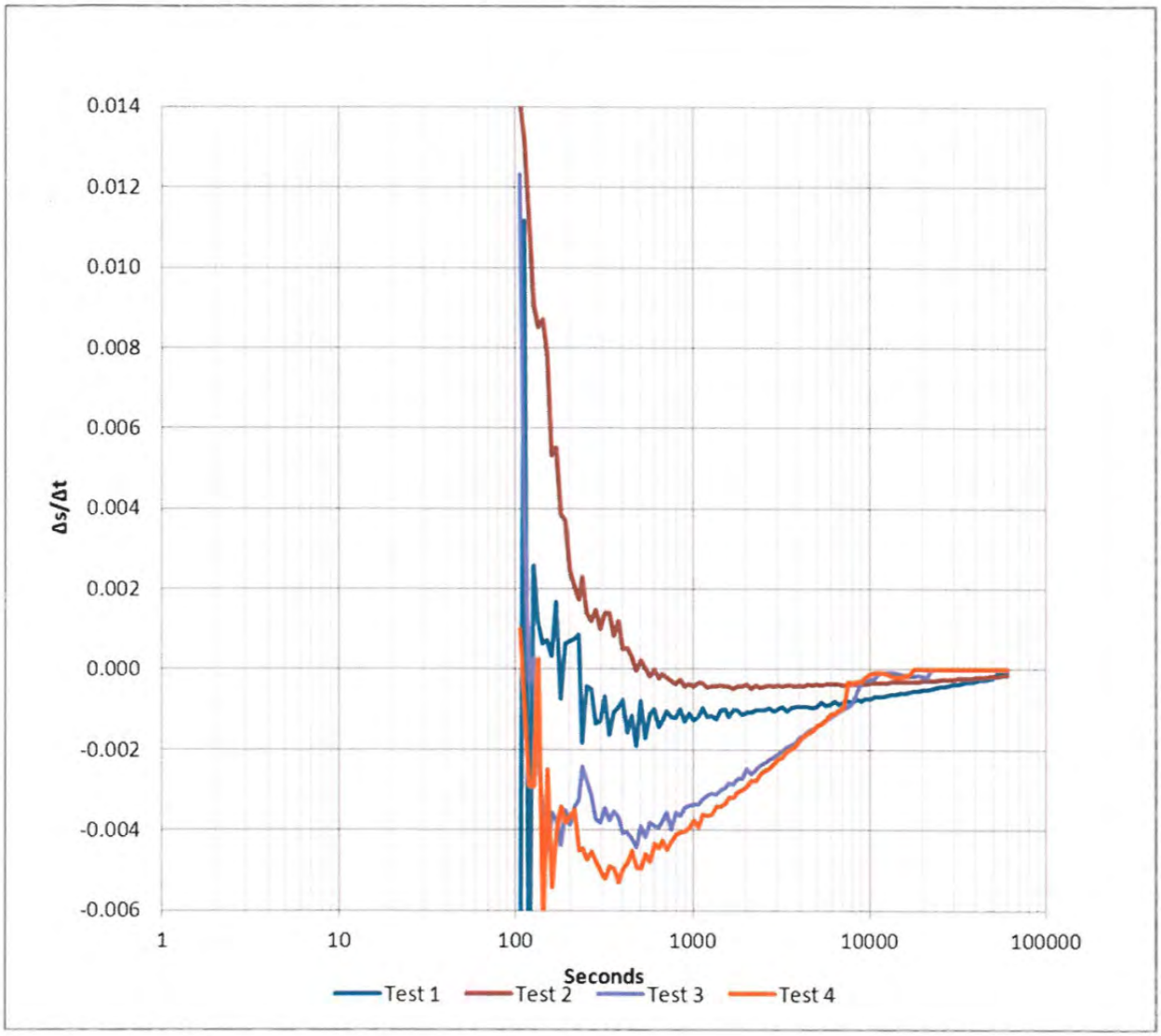
Saar, M.O., and Manga, M., 1999, Permeability-porosity relationship in vesicular basalts: Geophysical research Letters, v. 26, n. 1, pgs 111 – 114.



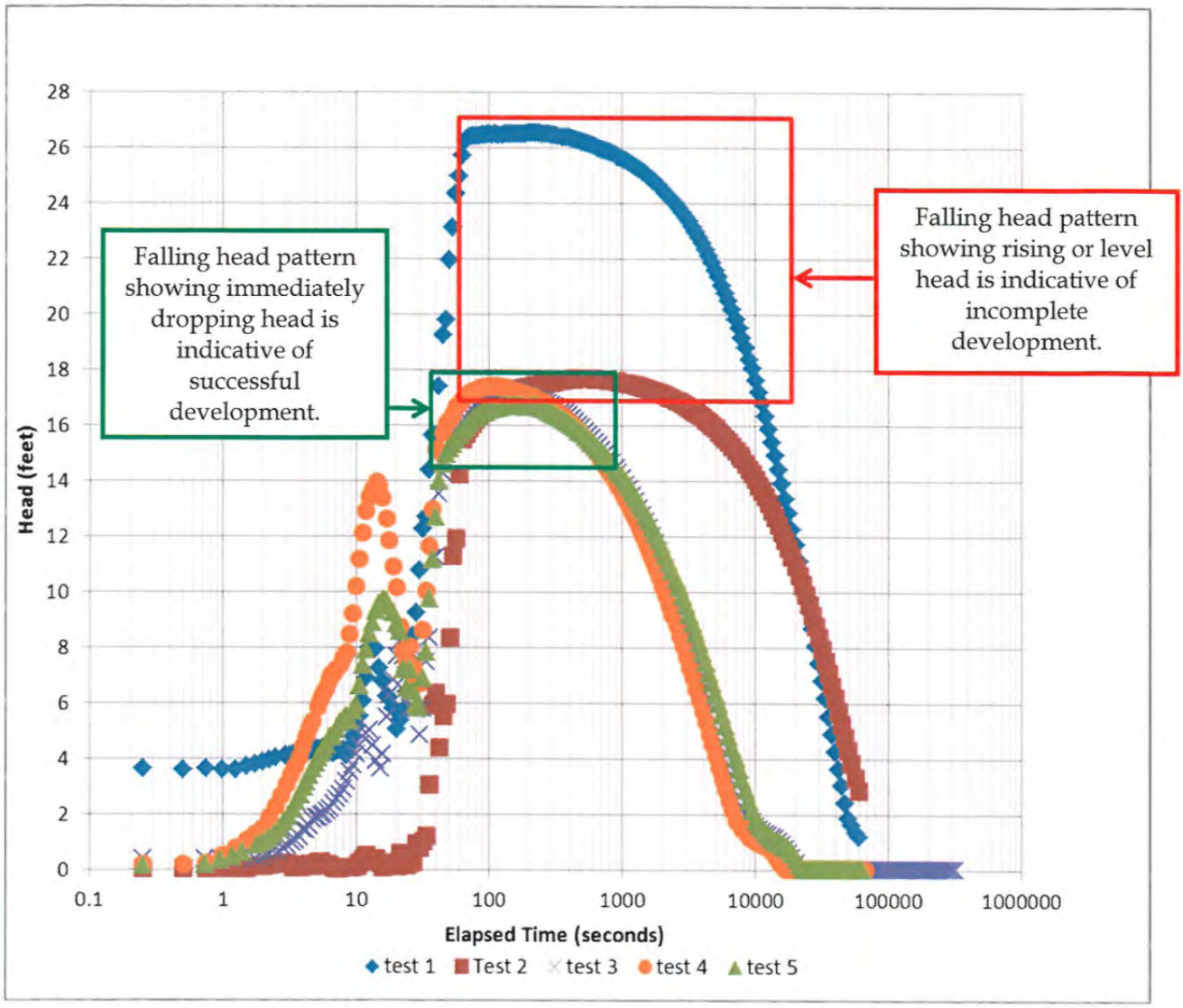
Attachment 1. Basic boring configuration during the falling head tests.



Attachment 2. Falling Head Test Hydrograph.



Attachment 3. Calculated Falling Head Test Rates of Change.



Attachment 4. Falling Head Patterns Indicative of Incomplete and Successful Development.

APPENDIX H

DRILLING AND SAMPLING DAILY WORK RECORDS (STAGE III)

This page intentionally left blank.

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Attend pre-job, mobilize and begin direct push activities | DATE: 06-14-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1 U-DIG # 13140541 | REPORT #: 01

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2.N/A
3.N/A

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CAT #2 (HHU CAT #4) HHUXL#3

BOREHOLE SUMMARY

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.
Borehole # ____ Tubing ( ) @ to ft bgs S.U.
Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Housekeeping.
0800	on site at 7:45 waiting for prejob
0825	Head to 200 East to Ace in
0900	Back at site, held prejob. Marty, Kent, Rory, Ergott, williams, mincy, + Rick present, Review package. RAP, DOW, ETC.
0945	Prejob over getting equipment ready, while RCT gives rig pressure, waiting for RCT To survey rig
1005	RCT (Jim mincey) is surveying rig (pre-survey)
1100	Lunch
1130	STill waiting for pre-survey to be completed
1415	KL is done with pre-survey, ready to set on hole Monday
1420	Head To ENW to unload Cement and pickup Samples
1450	Head to office
1510	Paper work
1530	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Ehrgott
NCO: williams, Travis
HPT: mincey
FWS: Franzen

WEATHER: 80 F, partly cloudy with winds from the southwest at 10-15 mph.

DOWNTIME: 8 hrs: Standby prejob, Rig survey

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: L O Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: L O Amos

REVIEWED BY: M. D. Walker
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. D. Walker DATE: 06-17-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Set-up and begin direct push activities		DATE: 06-17-13
LOCATION: "SX" Farm Stage III Soil Water Extraction	EXCAVATION: DAN-13- 0036R1 U-DIG # 13140541	REPORT #: 02

START CARD NO. SE48334	DECOMMISSION NO. AE22134	RWP: CO-762 Rev.3 SJHH-0080
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2.N/A 3.N/A	SITE/EQUIPMENT INSPECTION: (Yes) No	HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8823 Tubing (2 5/8") @ G.S. to 85' ft bgs; S.U. 5.3'

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0700	**Safety meeting at office. Topic: Driver Conduct at Accident Scene.**
0715	Head to 200 west (SX Farm)
0745	on site at SX waiting for POD
0830	Hold prejob for SX, Lock and tag are Topics
0840	Lockout on XL has been tested and is in operating
—	order. Rig inspection 607 hrs. Setup rig
0930	START DRIVING 2 5/8" ROD FROM G.S. on C8823
1015	STOP TO LET HEAD COOL
1040	RESUME DRIVING
1100	STOP TO LET HEAD COOL ~ 36' bgs
1125	RESUME DRIVING
1148	STOP TO LET HEAD COOL ~ 48' bgs
1200	LUNCH.
1240	RESUME DRIVING FROM 48' bgs.
1310	STOP TO LET HEAD COOL ~ 58' bgs.
1340	RESUME DRIVING.
1410	LET HEAD COOL
1425	RESUME DRIVING
1445	STOP DRIVING @ 85' bgs, SECURE WORK AREA EXIT
—	SX-FARM AND TRAVEL TO 3 RIVERS SCIENTIFIC TO PICK UP
—	LOGGING CART & TOOLS FOR LOGGING ACTIVITIES.
1620	AT OFFICE COMPLETE PAPER WORK
1630	END OF SHIFT

OPERATOR/LICENSE: Amos/1224 ES SUPPORT: Steffler, Ehrgott NCO: Vellenoweth, Jill HPT: Sim. Minich, B. Barnhard FWS: Franzen, Withrow	WEATHER: 89 F, mostly cloudy with winds from the southwest at 10 mph. DOWNTIME: NONE	DISCARDED ITEMS: 10 - LYNCH PINS

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: MIKE EHRGOTT TITLE : ES TECHNICAL PREPARER SIGNATURE: Mike Ehrgott	REVIEWED BY: D.J. Withrow TITLE: ES TECHNICAL REVIEWER SIGNATURE: DATE: 06-24-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities at boring #C8823.

DATE: 06-18-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 03

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A

2.N/A

3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8823 Tubing (2 5/8) @ 850' to 124 ft bgs; S.U. 2,3

Borehole # ___ Tubing ( ) @ to ft bgs S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Beware The Tiger.
0730	TRAVEL TO SX FARM
0800	on site waiting for RCT's
0830	RCT's on site, prejob mee in.
0840	Go to TX and drop off logging equipment and Shanda
0852	on site at SX, warm up rig
0900	Start driving pipe
0953	Let head cool
1015	Drive pipe
1045	AT 124', ready to pull inner rods and run soil removal Tool.
1100	RCT shut us down because of rain, Take lunch while waiting for rain to subside.
1130	Standby for rain
1200	Stand by for dosimetry issues. RCT's pull all electronic dosimetry.
1215	Head to EXW to get case ready for Aguila.
1600	Head to office. Get word we more good to go in SX Tomorrow.
1630	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Ehrgott
NCO: Jill + Izzy
HPT: Jeff + Jim
FWS: Franzen

WEATHER: 77 F, mostly cloudy with a chance of showers and thunderstorms.

DOWNTIME:
1.0 - waiting on RCT's
4.5- Rain + Dosimetry

DISCARDED ITEMS:
5- lynch pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos

TITLE : ES TECHNICAL PREPARER

SIGNATURE: Olin Amos

REVIEWED BY: M. D. Walker

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: [signature] DATE: 6-24-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities at boring #C8823.

DATE: 06-19-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 04

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2.N/A
3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8823 Tubing (2 5/8 @ 124 to 153 ft bgs; S.U. 1-3

Borehole # C8824 Tubing (2 5/8) @ 0 to 9 ft bgs S.U. 1-3

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Preventing Heat Stress.
0715	Head to smeer bld to get Aced into SX
0820	At SX waiting for POD
0840	POD
0900	At SX start pulling inner rods for soil removal process
0930	Drive Sampler 124'-126'
1000	Sampler out of hole, run inner rods backin
1035	Sampler out 126-128'
1115	Sampler out 128-130 run
1145	Lunch
1215	Drive pipe, run in inner pipe, continue to 155'+/-
1346	At depth @ 153' Hard between 142' and 146', Pull inner rod and move to C8824
1440	on C8824, Setup tooling and the equipment.
1450	Begin driving on C8824
1520	A 9 Feet. Shutdown rig, clean up site, Head to TX To pickup Aquila and Shanda at 1530.
1539	Head to office
1615	Paper work at office
1630	End Shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Ehrgott
NCO: Izzy, Jill
HPT: Jeff
FWS: Franzen

WEATHER: 73 F, mostly cloudy and breezy. Winds from the southwest at 10-15 mph.

DOWNTIME: .1 Re Ace

DISCARDED ITEMS:
1-Lynch pin
6-O-rings

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: [signature]
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 06-24-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities at boring #C8824. **DATE: 06-20-13**

LOCATION: "SX" Farm Stage III Soil Water Extraction | **EXCAVATION: DAN-13- 0036R1** U-DIG # 13140541 | **REPORT #: 05**

START CARD NO. SE48334 | **DECOMMISSION NO. AE22134** | **RWP: CO-762 Rev.3 SJHH-0080**

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2.N/A
3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CAT #2 HHU CAT #4 (HHUXL#3)*

BOREHOLE SUMMARY

Borehole # C8824 Tubing (2 5/8) @ 9 to 99 ft bgs; S.U. 1.5
Borehole # ___ Tubing ( ) @ to ft bgs S.U.
Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0700	**Safety meeting at office. Topic: Construction Equipment Dangers.**
0715	Head to SX
0745	AT SX, waiting for POD
0815	POD - Equipment Safety, keep pushing pipe on C8824
0845	RCTs on site, Begin pushing pipe H-S. 614 on XL
0940	Let head cool
1020	Drive pipe
1040	Let head cool
1105	Drive pipe
1130	Let head cool, Take lunch
1200	Push rods
1250	Let Head cool
1316	Drive pipe
1335	Let head cool, Help Tracy move pipe around, Take out 2.5" and bring in 2 5/8" Pipe
1400	Drive pipe
1426	Let head cool
1440	Drive pipe
1510	Let Hedd cool, RCT shut down site, AT 99 Feet
1530	Head to office
1600	AT office, do paperwork
1630	END SHIFT
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Ehrgott
NCO: Jill, Tracy
HPT: Jeff
FWS: Franzen

WEATHER: 75 F, mostly cloudy and breezy. Chance of rain.

DOWNTIME: 1 hr.-RCT's

DISCARDED ITEMS:
1 - 2 5/8 Drive
7 - Lynch Pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: D. W. Wallace
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 06-21-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities at boring #C8824.

DATE: 06-24-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 06

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A

2.N/A

3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8824 Tubing (2 5/8) @ 89 to 130 ft bgs; S.U. 1-3

Borehole # ___ Tubing ( ) @ to ft bgs S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Make Shift Work Safe Work.
0730	Head to SX
0800	AT SX, waiting for POD & RCTS
0830	POD, ACE in
0845	AT site, warm up and begin driving
0925	Let head cool
0955	Drive pipe
1010	Let head cool
1050	Drive pipe
1136	AT 124, Tripped out inner rod, Broken inner rod go get fishing tool, Take lunch
1200	Go to TX to get fishing taper tap
1210	on site fish out Broken rod and run sampler in hole
1300	Sampler in hole, waiting for operator to get back to drive Sampler for soil removal. Something about a alarm
1315	Run Samplers back to back from 124'-130' for Soil removal
1450	out of hole with 128-130' sample, Tip dummie Tip in
1530	Tip in, shut down, head to office
1555	AT office, paper work
1630	End shift

- 4 -

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler
NCO: Ruben
HPT: Jeff
FWS: Franzen

WEATHER: 80 F, mostly cloudy with a chance of showers. Winds from the southeast at 5-10 mph.

DOWNTIME: .5 POD

DISCARDED ITEMS:
5 - O-rings
2 - 4' inner rods

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Erin Amos

TITLE : ES TECHNICAL PREPARER

SIGNATURE: Erin Amos

REVIEWED BY: M.W. WALKUP

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: [signature] DATE: 06-25-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities at boring #C8824.

DATE: 06-25-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 07

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A

2.N/A

3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8824 Tubing 2 5/8 @ 130 to 153 ft bgs; S.U. 1.3

Borehole # — Tubing ( ) @ to ft bgs S.U.

Borehole # — Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0700	**Safety meeting at office. Topic: Working Together.**
0730	Head to SX
0800	At SX, shut down for lightining, Go to smart Building to get new dosimitery.
1000	lighting shut down over. Go to site and start pushing rod
1015	Begin pushing Pipe on C8824
1110	At depth @ 153' TD, Head adapter has a crack in it. Call Mike Walkup to see if he wants to take it To Town. Get rig surveyed for release to take to Town
1130	Lunch. RCT is checking with TX RCT To see if they have the case in TX yet. IT will take priority!
1200	waiting for RCT to pull inner-rods
1305	RCT on site, Trip out inner rods
1340	Rods out Held rig over so RCT can do survey.
1400	RCT is surveying rig
1450	head to ENR to Locate new head adapter Sub
1600	At ENR, round up subs.
1640	End shift
	NOTE: RCT still doing survey on XL @ C8824 At TD @ 153 feet
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler
NCO: Ruben
HPT: Jeff
FWS: Franzen

WEATHER: 75 F, mostly cloudy with a chance of showers and thunderstorms. Winds from the east at 5 mph.

DOWNTIME:
2 hrs. - lighting
1 hr. - RCT

DISCARDED ITEMS:
1 - head adapter sub
4 - orings
2 - Lynch pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos

TITLE : ES TECHNICAL PREPARER

SIGNATURE: Olin Amos

REVIEWED BY: M. W. WALKUP

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: [signature] DATE: 06-26-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Transport HHUXL #3 to ENW for repair of crossover sub.

DATE: 06-26-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 08

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A

2.N/A

3.N/A

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

Borehole # ____ Tubing ( ) @ to ft bgs S.U.

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Understanding Safety Signs. Do paper work, waiting on
0	Truck to pick up XL
1100	Truck on site to load up XL
1120	Head to Energy northwest shop
1200	AT shop unload XL
1215	Lunch
1245	change out adapter sub on XL
1530	Steam clean XL
1600	Head to office
1630	AT office. End shift
	NOTE: Truck will be here at 0730 To Load XL

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler
NCO: Ruben
HPT: Jeff, Jim
FWS: Franzen

WEATHER: 84 F, partly cloudy with winds from the southwest at 5-10 mph.

DOWNTIME: —

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M. D. Wallace
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: DATE: 06-28-13

10/06/09 Rev 1

ENERGYSOLUTIONS

FIELD CLEANING AND/OR DECONTAMINATION

Page 1 of 1

PROJECT: SX

LOCATION OF CLEANING/DECONTAMINATION: Env

THE FOLLOWING EQUIPMENT HAS BEEN CLEANED AND/OR DECONTAMINATED

LIST TYPE OF DETERGENT: ☐ Non-phosphate ☑ Other Simple Green

EQUIPMENT	ID NUMBER			
☑ XL	#3	CLEANING	☑ YES	☐ NO
☐		DECONTAMINATION	☐ YES	☐ NO
☐				
☐				

DOWNHOLE EQUIPMENT		SIZE	DATE
☐	Ea		
☐	Ea		
☐	Ea		
☐	Ea		
☐	Ea		
☐	~~Ea~~ NA		
☐	Ea		
☐	Ea		
☐	Ea		
☐	Ea		
☐	Ea		

REMARKS/OBSERVATIONS:

NA

Colin Ames 6-26-13

Person Conducting Cleaning and/or Decontamination Date

Reviewed by Date

100609 Rev. 0

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Transport HHUXL #3 to "SX" Farm and resume direct push activities.

DATE: 06-27-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 09

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2.N/A
3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C9825 Tubing (2 5/8) @ 0 to 73 ft bgs; S.U. 853

Borehole # ~~—~~ Tubing ( ) @ to ft bgs S.U.

Borehole # ~~—~~ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Clear The Jam
0710	Head to EMW To load XL and take to SX
0755	Head to SX with XL
0830	on site at SX, unload XL
0845	Ace in
0900	Set up XL on C9825
0935	All set up, Begin driving pipe
1015	Let head cool, 1045 Drive Pipe
1110	Let head cool
1115	Lunch
1145	Driving pipe
1230	Head Hot Let cool
1300	Drive pipe
1315	Let head cool
1345	Drive pipe
1410	Let head cool
1430	Drive pipe
1445	Let head cool, head to vivid Learning to do HgeT
1530	AT vivd do HgCT
1630	AT oFFice, end shiFT
	NOTE: Pushed to 73 Feet on C9825. Have 5.35K up
	N A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Ehrgott
NCO: Snooks, Izzy
HPT: Jeff
FWS: Franzen

WEATHER: 91 F, partly sunny with light and variable winds.

DOWNTIME: —

DISCARDED ITEMS:
1- Drive head
5- Lynch Pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M.W. Walker
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 06-28-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8825 | DATE: 06-28-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 10

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2.N/A
3.N/A

SITE/EQUIPMENT INSPECTION: Yes No | HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8825 Tubing 2 5/8 @ 73 to 88.5 ft bgs; S.U. 5.4
Borehole # N/A Tubing ( ) @ to ft bgs S.U.
Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Everyone Is Responsible For Safety.
0715	
0745	on site, waiting for POD, Having trouble with RCT support
0940	Got word that SX will run, Aguila and weakley will run SX
1100	STOPPED PUSHING LET HEAD COOL DOWN CURRENTLY AT 79.3 FEET, STOP PUSHING FOR LUNCH.
1110	LUNCH
1140	END OF LUNCH
1215	STOPPED TO LET HEAD COOL DOWN CURRENTLY AT ~~78.0 FEET~~ 82.0 FEET
1305	STOPPED PUSHING LET HEAD COOL DOWN CURRENTLY AT 85.5 FEET
1400	STOPPED PUSHING LET HEAD COOL DOWN CURRENTLY 88.5 FEET, STOPPED CLEANED UP SITE, SECURED, HEAT RIGEMENT IN EFFECT 50/50.
1430	ARRIVED AT ES OFFICE COMPLETE PAPERWORK, TIMESHEETS
1530	END OF SHIFT

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: ~~Steffler~~ HOOPES, WEAKLEY
NCO: JJ11
HPT: MINCEY
FWS: Franzen

WEATHER: 97 F, mostly sunny and hot. Winds will be light and variable.
DOWNTIME: ~~2 1-13 14 AH~~ 3 hrs FOR SX SUPPORT.

DISCARDED ITEMS:
3 LYNCH PINS

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: AGUILA HOOPES
TITLE : ES TECHNICAL PREPARER
SIGNATURE:

REVIEWED BY: M. W. WALKER
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: DATE: 07-01-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8825 | DATE: 07-01-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1 U-DIG # 13140541 | REPORT #: 11

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2.N/A
3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No | HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY
Borehole # C8825 Tubing (2 S/S @ 85 to 103 ft bgs; S.U. 1-3
Borehole # ___ Tubing ( ) @ to ft bgs S.U.
Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING
Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Hazard Awareness---The Little Things Count.
0715	Head to badging to pickup badge.
0815	At site waiting for POD
0840	Head to site, Rig inspection
0900	Begin pushing pipe
0940	Fuel truck here, fuel up, RCT shut us down due To coverage. Go to TX to relieve Engott
0940	No support for SX (RCT)
1100	Lunch
1130	No support for SX (RCT)
1630	End Shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler
NCO: Ruben
HPT: Jeff
FWS: Franzen

WEATHER: 107 F, mostly sunny and hot. Winds will be from the northwest at 5-10 mph.

DOWNTIME: 4hrs- Support

DISCARDED ITEMS: 1- Lynch Pin

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: [illegible]
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [illegible] DATE: 07-03-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8825

DATE: 07-02-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 12

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2.N/A
3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C88-25 Tubing (2 5/8 @ 103 to 124 ft bgs; S.U. 7.3

Borehole # ___ Tubing ( ) @ to ft bgs S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: PPE---Eye Injury Protection.
0820	Go to rig Begin pushing pipe
0910	At Total depth for Soil removal (124') Trip out inner string and run sampler in from 124'. 130'.
0940	Steve came and shut us down for heat.
1000	down for heat, no work for the rest of the day
1100	lunch
1130	down because of temperature
1630	End shift
	note: 1. at soil removal depth @ 124 feet
	2. Inner Rod is out of the hole, ready to run in Sampler.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler
NCO: Ruben
HPT: Teet
FWS: Franzen

WEATHER: 106 F, partly cloudy and hot. Winds will be light and variable.

DOWNTIME: 6.5 hrs. Temp.

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M.W. Wheeler
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 07-08-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8825

DATE: 07-03-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 13

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A

2.N/A

3.N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # 8825 ML / 8857 Tubing (7 5/8") @ 124 to 130.0 ft bgs; S.U. 4.3

Borehole # N/A Tubing ( ) @ to ft bgs S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Cuts And Burns.
0710	TRAVEL TO ENW, LOAD RIG #2 POWERS EQUIP.
0800	TRAVEL TO SX FARM FOR PRE JOB
0830	PRE-JOB AND RCE-ING.
0845	TRIP IN SAMPLER TO 124.0' bgs FOR START OF SOIL
—	REDUCTION ZONE 124.0 TO 126' (TRIP OUT)
0945	TRIP IN SAMPLER TO 126 TO ~~128~~ 128.0' SOIL REDUCTION
1100	TRIP IN SAMPLER TO 128.0' bgs 128.0 TO 130.0' bgs
—	FOR SOIL REDUCTION, A. HOOPES & M. WEAKLEY TAKING OVER
—	OPERATIONS.
1208	COMPLETED SOIL REMOVAL FROM 128 TO 130, WILL CONTINUE PUSHING AFTER LUNCH TO TD DEPTH.
1215	LUNCH
1245	END OF LUNCH
1255	ARRIVED BACK ON SITE TO TRIP BACK IN INNER ROD AND SETUP FOR NEXT PUSH OPERATION. CLEAN UP AND SECURE SITE.
1410	ARRIVED AT ES OFFICE, PAPERWORK TIMESHEETS
1630	END OF SHIFT

N/A

OPERATOR/LICENSE: Ehrgott/3115
ES SUPPORT: Steffler, Hoopes, Weakley
NCO: R. Revuelta
HPT: J. Clayton
FWS: Franzen WITHROW

WEATHER: 101 F, mostly sunny and hot. Winds will be light and variable.

DOWNTIME: 1 hr 30 min FOR FEILD SUPPORT

DISCARDED ITEMS:
1 INNER ROD
2 LYNCH PINS

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: AQUILA HOOPES
TITLE : ES TECHNICAL PREPARER
SIGNATURE:

REVIEWED BY: M. W. WEAKLEY
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: DATE: 07-03-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8825 | **DATE:** 07-08-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT # 14**

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole #C8825 Tubing (2.5") @ 130.0' to 153 ft bgs; S.U. 1.3

Borehole #C8826 Tubing (7 5/8") @ 0 to 29 ft bgs; S.U. 95.3

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.		
2.	N/A	
3.		

TIME	WORK SUMMARY
~~0600~~ 0700	Safety meeting at ES office, Topic: Employee Responsibility
0715	Travel to SX-Farm
0745	AT Shirt getting Acad
0905	AT SX, waiting for pusher
0930	Begin pushing pipe on C8825
0925	AT TD @153', pull inner rods and move over To C8826
1015	Setup on C8826, Rig up tooling and begin driving
1050	Broke drive head, fuel truck on site, fuel up rig
1110	Go to TK To get drive head and then go to lunch
1130	lunch
1200	Drive pipe
1240	Let head cool at 25'
1310	Drive pipe, drove one rod
1320	Head Hot, Let cool
1350	Go back in TO drive pipe,
1355	Shut down, due to heat exposure, (wet bulb), Go get fuel in pickup, gather material for tomorrow.
1456	Head to office
1530	Paper work
1630	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler
NCO: Snook, ,Villarreal
HPT: Mincy ,, Clayton
FWS: Franzan Withrow

WEATHER: Sunny 95 degrees

DOWNTIME:
1.0- POP
2.5- Due to Heat, wet bulb

DISCARDED ITEMS:
1-Drive Head
5-Lynch Pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: W. Walkup
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 07-09-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8826 | **DATE:** 07-09-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 15

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1 HHU CAT #2 (HHUXL#3)*

BOREHOLE SUMMARY

Borehole #C8826 Tubing (2.5") @ 29.0' to 41 ft bgs; S.U. 5.3

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.		
2.	NA	
3.		

TIME	WORK SUMMARY
~~0700~~ 0600	Safety meeting at ES office, Topic: Kids and Car Safety
0730	Travel to SX-Farm
0800	AT SX, waiting for POD
0820	POD
0830	Head to site
0840	inspection of site and equipment 3318 hrs. on XL
0910	Let head cool
4140	Drive pipe
1046	Let head cool
1120	Drive pipe
1130	Head is hot @ 58 feet, Take lunch
1200	Drive pipe
1279	Let head cool
1310	Drive pipe
1330	Let head cool
1400	Drive pipe
~~1414~~ 1414	Head Hot Let cool
1445	Drive pipe
1500	Head Hot, Let cool
1515	Going back in to drive pipe again, RCT came out and shut us down due to Heat issues.
1530	Head to office
1600	Do paper work
1630	End Shift ~~AM~~

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler
NCO: ,Villarreal
HPT: Mincy, Clayton
FWS: Franzan Withrow

WEATHER: Sunny 98 degrees

DOWNTIME: 1 hr. Heat, 1 hr. POD

DISCARDED ITEMS:
(1) Drive Head Coupler
(1) Lynch Pins
(1) Drive Pin (Retainer)

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Ames
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Ames

REVIEWED BY: M. D. Withrow
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 07-12-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8826 | **DATE:** 07-10-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 16

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* | *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8826 Tubing (2.5") @ 81.0' to 109 ft bgs; S.U. 5.2

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: The Right Way to Use a Portable Fire Extinguisher- Part 1
0730	Travel to SX-Farm
0900	on site, waiting for POD and operator
0900	Operater on site go to rig and warm up & inspect
0915	Drive Pipe - RCT shut us down due to no IH Support. waiting on word from Steve Withrow
0945	Have IH, Begin Driving
1020	Head Hot @ 91 Foot, Let cool
1050	Drive Pipe
1120	Let head cool
1130	lunch
1200	Drive pipe
1220	Shut down by IH for heat. AT 109' with 5.2 STKUP
	Head to EMW to find a fix for the logging cart.
1515	AT office do paper work
1630	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler
NCO: ,Villarreal
HPT: Mincy, Clayton
FWS: Franzan Withrow

WEATHER: Sunny 92 degrees Windy

DOWNTIME:
1 hr. operator
4.5 hr. IH

DISCARDED ITEMS:
2-Lynch Pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. Wilkins
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] DATE: 07-12-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8826 | **DATE:** 07-11-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 17

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* | *HHU CAT #2* | (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8826__ Tubing (2.5") @ 109.0' to 130' ft bgs; S.U. 2.2

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: The Right Way to Use a Portable Fire Extinguisher- Part 2
0730	Travel to SX-Farm
0800	Waiting for POD (on site)
0835	POD (head to site)
0845	Start driving pipe
0920	at 124' Tripout inner rods.
0930	Have broken rod, Fish out and run sampler in
1030	Drive sampler for Soil removal, Take 3 samples from 124 to 130.
1215	Soil removal complete, dummy tip in place and ready to drive to TD. Shut down due to RCT ~~Support~~ Support.
1230	lunch
1300	Head to get material for tomorrow. Go to EMR.
1600	Head to office
1640	End shift

NA

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan Withrow

WEATHER: Sunny 92 degrees

DOWNTIME: 4 hr. RCT's

DISCARDED ITEMS: 1 - 4 foot inner Rod. 4- Lynch pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. D. Williams
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: _____ **DATE:** 07-12-13

10/06/09 Rev 1

ENERGY SOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8826 | **DATE:** 07-12-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 18

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8826 Tubing (2.5") @ 130.0' to 130 ft bgs; S.U. 2.2

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Hand Safety / Avoiding Injury.
0730	Travel to SX-Farm.
0800	AT SX, waiting for POD. No support for SX work only enough RCTS for TX. Go to office
12:00	Lunch
12:30	No Support To work SX, not enough RCT's.
16:30	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan Withrow

WEATHER: Sunny 90 degrees

DOWNTIME: 8 hrs. due to Support

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: [illegible]
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [illegible] **DATE:** 07-15-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue direct push activities on boring #C8826 | **DATE:** 07-15-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT # 19**

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* | *HHU CAT #2* | (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8826__ Tubing (2.5") @ 130.0' to 153 ft bgs; S.U. 1.2

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Ladder Safety-1
0715	Travel to SX-Farm.
0745	AT T-ailer, waiting for POD, only have coverage for 1 rig
0830	Head to SX, get ready to push pipe to 153
0840	Begin pushing pipe
0930	AT TD @ 153 Feet, pull inner rods
1000	inner rods out, clean up site, move rig of of hole so holes can be accessed for logging. RCT's went to TX to support them.
1130	lunch
1200	Head to South bld. to ace into a farm,
1220	Go to a farm and talk to Rick Franzen about Tags. The caps are off so Rick will place tags when they get done. Head to Enw to run cement tests with reed simpson.
1600	AT office, ran tests at Enw. do paper work and Time sheet
1630	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan Withrow

WEATHER: Sunny 94 degrees

DOWNTIME: 1 hr. RCTs

DISCARDED ITEMS: 1-Drive Head 2 5/8"

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. W. WALKER
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: _____ **DATE:** 07-16-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Logging activities for C8823, C8824, C8825, C8826 | **DATE:** 07-16-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 20

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | HHU CASE#1 | HHU CAT #2 | (HHUXL#3)

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8825	152.5' to 90.0'	MOIST.
2. C8826	152.5' to 90.0'	MOIST.
3.		
4.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Ladder Safety ~~AL~~ ME PART-2
0730	Travel to SX-Farm.
0810	ARRIVE ~~AT~~ ME AT MO-563 FOR PRE-JOB by S. WITHROW
0820	ACE-IN.
0825	STAND-BY FOR RCT SUPPORT
0937	TRAVEL FROM SX FARM TO TX-FARM AND SIGN OUT SOURCE
–	FOR MOISTURE LOGGING.
1000	TRAVEL TO SX FARM SETUP FOR LOGGING C8825
→	CHECKED WITH RCT ABOUT SWABBING HOLES WE ARE GOOD...
–	TO LOG.
1054	START LOGGING C8825 FROM 152.5' bgs WITH MOISTURE. (TAKE LUNCH)
1222	STOPPED MOISTURE LOGGING AT 90.0' bgs PER DOW. MOVE AND SET-UP
–	ON C8826.
1315	START MOISTURE LOGGING ON C8826 FROM 152.5' bgs.
1433	STOPPED LOGGING AT 90.0' bgs PER DOW. RETURN TOOL TOO
–	SURFACE, CHECK ZERO -0.81'
1442	POST CHECK WITH SOURCE.
1500	SECURE WORK AREA 1505 EXIT WORK ZONE.
1520	TRAVEL TO ES OFFICE
1550	WORK ON COMPLETING PAPER WORK, TIME CARD.
1630	END OF SHIFT.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Amos, Steffler, EHRGOTT
NCO: Villarreal, Williams
HPT: Clayton
FWS: ~~Franzen~~ Withrow

WEATHER: Sunny 96 degrees

DOWNTIME: 1 HR 13 MIN WAITING FOR RCT SUPPORT.

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Mike Ehrgott

REVIEWED BY: M. W. WALKUP
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 07-17-13

10/06/09 Rev I

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Logging activities for C8823, C8824, C8825, C8826 | **DATE:** 07-17-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT # 21**

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (NO)

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.		
2.	N/A	
3.		
4.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: The Hazard Rating NFPA Diamond Sign
0730	Travel to SX-Farm.
0800	PRE-JOB NOT ENOUGH RESOURCES (RCT's) TO SUPPORT BOTH
—	FARMS TX- SX... WORK WILL BE PERFORMED AT TX-FARM
0930	TRAVEL TO TX-FARM... PICK UP LOGGING TECH S. ICAYAN.
—	AND TAKE HER TO ES OFFICE.
1030	TRAVEL TO ENW TO SUPPORT ES Drill CREW WITH
	PERFORMANCE CHECKS RIG #4 AND PARCTICE WITH CEMENTING FOR
	SOIL WATER EXTRACTIONS.
1200	LUNCH
1500	RIG #4 STILL NOT PERFORMING WITH HHU.
1630	END OF SHIFT

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler, Ehrgott ,Icayan
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan Withrow

WEATHER: Sunny 96 degrees

DOWNTIME: 8 HRS
NO RCT Support.

DISCARDED ITEMS:
NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D W WALKER
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 07-18-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Logging activities for C8823, C8824, C8825, C8826		**DATE:** 07-18-13
LOCATION: "SX" Farm Stage 3 Soil Water Extraction	**EXCAVATION:** DAN-13- 0036R1 **U-DIG #** 13140541	**REPORT #** 22
START CARD NO. SE48334	**DECOMMISSION NO.** AE22134	**RWP:** CO-762 Rev.3 SJHH-0080
SAMPLING SUMMARY *Sample #'s Interval %* 1.N/A 2.N/A 3.N/A 4.N/A	**SITE/EQUIPMENT INSPECTION:** (Yes) No **BOREHOLE SUMMARY** Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U. Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U. Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.	*HHU CASE#1 HHU CAT #2* (HHUXL#3) **GEOPHYSICAL LOGGING** *Boring # Interval Type* 1. C8824 152.5' to 90.0' Moist 2. C8823 152.5' to 90.0' Moist 3. 4.

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Flammable Liquid safety
0720	Travel to SX-Farm. ES Drill crew stands by for Logging
0800	Pre-Job at MO 563
–	Moisture Logged on C8824, and C8823 from
—	152.5' bgs to 90.0' bgs on Both Boreholes.
–	ES Drill crew Reached cementing an ENW shop
—	in support of Stage 3 Soil water extraction wells.
1330	Performed an Demo with WRPS Management after
—	lunch.
–	Place work area's in safe condition.
1630	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT; Amos, Ehrgott, Icayan* *NCO: , Villarreal* *HPT: Clayton* *FWS: Franzan Withrow*	**WEATHER:** Sunny 98 degrees **DOWNTIME:** ES Drill crew stands by for Logging to be completed.	**DISCARDED ITEMS:** None

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike Ehrgott **TITLE :** *ES TECHNICAL PREPARER* **SIGNATURE:** Mike Ehrgott	**REVIEWED BY:** Mike Walker **TITLE:** *ES TECHNICAL REVIEWER* **SIGNATURE:** Mike Walker **DATE:** 07-29-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Logging activities for C8823, C8824, C8825, C8826 | **DATE:** 07-22-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 23

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No) | **HHU CASE#1** | **HHU CAT #2** (HHUXL#3)

BOREHOLE SUMMARY

Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.

Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.

Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8823	152 - 90	combo
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: **Back Injury Prevention**
0730	S. Icayan Travel to SX-Farm to support Gamma logging activities. on C8823
0800	ENW practice cementing. See Reed Simpsons field notes
1200	lunch
1230	continue logging and practice cementing.
1400	Exit Zone (SX) load up head to office
1530	Paper work
1630	End shift.
	NOTE: (A) Shanda logged from 152 to 90 feet with the combo tool on C8823
	(B) Cementing procedures were gone through at Energy Northwest.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT; Amos, Steffler, Icayan
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan Withrow

WEATHER: Sunny 98 degrees

DOWNTIME:

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: LO Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: L O. Amos

REVIEWED BY: M W WALK-UP
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 07-29-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Logging activities for C8823, C8824, C8825, C8826		**DATE:** 07-23-13
LOCATION: "SX" Farm Stage 3 Soil Water Extraction	**EXCAVATION: DAN-13- 0036R1** **U-DIG # 13140541**	**REPORT # 24**
START CARD NO. SE48334	**DECOMMISSION NO. AE22134**	**RWP: CO-762 Rev.3 SJHH-0080**
SAMPLING SUMMARY *Sample #'s Interval %* 1.N/A 2.N/A 3.N/A 4.N/A	**SITE/EQUIPMENT INSPECTION:** *Yes (No)*	***HHU CASE#1 HHU CAT #2 HHUXL#3***
	BOREHOLE SUMMARY *Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.* *Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.* *Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.*	**GEOPHYSICAL LOGGING** *Boring # Interval Type* 1. C8824 152-90 combo 2. N/A 3.

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: **Working Together**
0730	S. Icayan Travel to SX-Farm to support Gamma logging activities. on C8824
0800	ENW practice cementing.
1200	lunch
1230	continue cementing evaluation + practice, shoada logging on C8824
1500	Logging complete on C8824 (combo) Testing on cement complete
1530	Head to office
1600	Paper work
1630	End shift
	N/A

OPERATOR/LICENSE: Amos/1224 *ES SUPPORT; Amos, Steffler, Icayan* *NCO: ,Villarreal* *HPT: Clayton* *FWS: Franzan Withrow*	**WEATHER:** Sunny 98 degrees **DOWNTIME:** 0	**DISCARDED ITEMS:** 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: J O Amos	**REVIEWED BY:** [illegible]
TITLE : *ES TECHNICAL PREPARER*	**TITLE:** *ES TECHNICAL REVIEWER*
SIGNATURE: J O Amos	**SIGNATURE:** [illegible] DATE: 07-29-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Logging activities for C8823, C8824, C8825, C8826 | **DATE:** 07-24-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 25

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No | *HHU CASE#1 HHU CAT #2 HHUXL#3*

BOREHOLE SUMMARY

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8825	152.0' to 90.0'	Combo 860, 2in
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: **Welding- Physical Hazards.**
0730	Travel to SX-Farm for pre-job and to support Gamma logging activities.
0800	AT SX-FARM MO 563 FOR PRE-JOB by S. WITHROW
0850	SET UP ON C8825 FOR 860, LABR= Combo Tool Logging
0930	START Logging. COMPLETE 5' REPEAT AND CONTINUE Logging
1130	LUNCH.
1335	STOPPED Logging AT 90.0' bgs
1350	POST CHECKS
1420	SECURE WORK AREA EXIT FARM, RCT RETURNING SOURCE BACK TO TX-FARM.
1445	TRAVEL BACK TO ES OFFICE, WORK ON PAPER WORK, TIME CARD.
1630	END OF SHIFT.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Steffler, ,Ehrgott
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan Withrow

WEATHER: Sunny 98 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: M. D. WALTHUP
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 07-29-13

10/06/09 Rev I

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Gamma Logging activities for C8826

DATE: 07-25-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 26

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.

Borehole #____n/a____ Tubing ( ) @ to ft bgs; S.U.

Borehole # ___n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. C8826	152' TO 90' (COMBO)	BOREHOLE
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Eye Protection
0750	Travel to SX-Farm for pre-job and to support Gamma logging activities.
0805	PRE-JOB and ARE-IN
0900	SETUP TO LOG C8826
0931	START Logging WITH COMBO TOOL
1115	LUNCH
1215	Logging IS CONTINUING AFTER LUNCH
1421	STOPPED GAMMA Logging AT 90.0' bgs POST CHECKS
—	RETURN TO ZERO CHECK RCT SURVEY Logging EQUIP.
—	OUT AND LOADS INTO PICKUP... WILL BE STAGED FOR
—	TX-Logging ON FRIDAY.
1510	SECURE WORK AREA AND LEAVE SX-FARM FOR ES OFFICE
1530	ARRIVE AT ES OFFICE COMPLETE PAPER WORK.
1630	END OF SHIFT.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Ehrgott
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Sunny 98 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: W. D. WALKUP
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 07-28-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: ES drill crew stand-by for Logging data review

DATE: 07-26-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 27

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # n/a *Tubing ( ) @ to ft bgs; S.U.*

Borehole # n/a *Tubing ( ) @ to ft bgs; S.U.*

Borehole # n/a *Tubing ( ) @ to ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.		
2.	N/A	
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Your Hearing: Keep it for a Lifetime
--------	ES drill Crew stand-by for SX- Farm logging data review by WRPS management.
	ES drill Crew Travel to ENW to trouble shoot hydraulics on HHU Rig #4
1200	lunch
1230	Trouble shoot Rig #4. change out block on valve bank.
1410	Still not building pressure
1530	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Sunny 98 degrees

DOWNTIME: 8 hrs. loggings

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. D. Withrow
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 07-31-13

10/06/09 Rev I

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: ES drill crew stand-by for Logging data review, Stage piping and support equipment.

DATE: 07-29-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 28

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # — Tubing ( ) @ to ft bgs; S.U.

Borehole # — Tubing ( ) @ to ft bgs; S.U.

Borehole # — Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Saving Lives with Lockout Tagout
0730	STandby for logging and well Location setting
1200	lunch
1230	STandby for logging (Getting gear ready to install)
1630	End shift
	NOTE: A. Moved equipment to SX
	B. Loaded pipe and material for well.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Simpson
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Sunny 98 degrees

DOWNTIME: 9 hrs. logging N/A

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. W. Withrow
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 07-31-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin decommissioning and well installation | DATE: 07-30-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1 U-DIG # 13140541 | REPORT #: 29

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: Yes (No) | HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

Borehole # ____ Tubing ( ) @ to ft bgs S.U.

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Understanding Safety Signs.
0730	Head to SX
0800	no support for SX work, Go unload pipe at site
	Standby for RCT
1200	lunch
1230	Standby for RCT
1630	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Ehrgott, Simpson
NCO: ⊘
HPT: ⊘
FWS: Withrow

WEATHER: 94 F, partly sunny. Winds will be light and variable

DOWNTIME:
8 hrs. N/A RCT Support

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M. W. Withrow
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. W. Withrow DATE: 07-31-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: If support is available begin decommissioning and well installation of #C8825

DATE: 07-31-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 30

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8825 Tubing (2 5/8" @ 0 to 138 ft bgs; S.U 2.3

Borehole # C8825 Tubing (2 5/8") @ 153 to 0 ft bgs S.U. 0

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: Why Wear Hardhats.
0730	Head to ~~SX~~ SX
0800	on site, waiting for POD
0815	POD, Acc in.
0830	AT Rig, setup on hole, change out cable (winch)
0930	Setup on C8825, Marked reference point, waiting on RCT to pull pipe
1000	RCT on site pull pipe
1100	Pipe (2 5/8") out go to lunch
1130	lunch
1200	on site reinstall 2 5/8" with knock out tip
1330	2 5/8" is at 138' bgs. move rig to C8826 and setup
1410	shut down for RCT meeting
1430	Go to shop to get material for tomorrow
1530	Head to office
1600	Do paperwork
1630	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Ehrgott, Simpson
NCO: Ruben
HPT: Soff, Tooy
FWS: Withrow

WEATHER: 95 F, partly sunny. Winds will be from the north at 5-10 mph.

DOWNTIME: 4 hrs. RCT

DISCARDED ITEMS: 2- lynch pins

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M.W. Walker
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 08-01-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin well installation in boring #C8826

DATE: 08-01-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 31

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C 8826 Tubing (2 5/8) @ 153 to 0 ft bgs; S.U.

Borehole # C8826 Tubing (2 5/8) @ 0 to 134.81 ft bgs S.U. 1.77

Borehole # C8824 Tubing (2 5/8 153 to 0 2 5/8 @ 0 to 143 ft bgs; S.U. 1.3

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0700	Safety meeting at office. Topic: A Single Second.
0730	Head to SX
0800	AT SX, waiting for RCT's
0831	Pull 2 5/8" pipe out of C8826
0935	Pipe out, reinstall with knock out tip
1045	Pipe back in hole @ 134:81, move rig to C8824
1130	lunch
1200	Waiting for RCT to show to pull pipe
1300	RCT on site pull pipe out of C8824 and reinstall with knockout tip.
1510	Pipe in, clean up site
1530	Head to office
1600	Do paper work
1630	End shift
	note: Pulled and reinstalled 2 5/8" pipe on C8826 and C8824
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Ehrgott, Simpson
NCO: Rick
HPT: Jeff
FWS: Withrow

WEATHER: 91 F, partly sunny. Possibility of showers or thunderstorms

DOWNTIME: 1.5 hrs RCT

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: [illegible]
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [illegible] DATE: 8-02-13

10/06/09 Rev I

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin well installation in boring #C8823 — DATE: 08-05-13

LOCATION: "SX" Farm Stage III Soil Water Extraction — EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 — REPORT #: 32

START CARD NO. SE48334 — DECOMMISSION NO. AE22134 — RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY — SITE/EQUIPMENT INSPECTION: (Yes) No — HHU CAT #2 HHU CAT #4 (HHUXL#3)

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

BOREHOLE SUMMARY

Borehole # C 8823 Tubing (2 5/8) @ 153 to 0 ft bgs; S.U. —

Borehole # C8823 Tubing (2 5/8) @ 0 to 143.18 ft bgs S.U. 1. BH

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Laser Safety.
0530	" "
0538	Head to SX Farm for POD
0605	AT SX waiting for support (RCT's)
0713	Ace in (RCT's at Trailer)
0720	AT Site, still waiting for RCT's
0736	RCT's on site, move Rig to C8823 and pull 2 5/8"
0845	2 5/8" out replace with knockout tip and run back in
0935	AT TD @ ~~144~~ 143.28, measure STK-UPS
1000	lunch
1030	waiting on word for completion of C8823
1100	Got word to go ahead with C8823, waiting for Support
	Sat Bottom of Sump at 133.1
1130	No Support
1430	End Shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Walkup, Simpson
NCO: JZ
HPT: Jim Mince
FWS: Withrow

WEATHER: 96 F, mostly sunny. Winds will be from the south at 5-10 mph.

DOWNTIME: 1.5 hr, RCT; 4 hrs Support

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M. W. WALKUP
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. W. Walkup DATE: 08-07-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin well installation in boring #C8823

DATE: 08-06-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 33

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole #C8824 Tubing (2 5/8) @ 144 to 133 ft bgs; S.U. 3

Borehole # ~~C~~ Tubing ( ) @ to ft bgs S.U.

Borehole # ~~/~~ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0530 ~~0600~~	Safety meeting at office. Topic: Nitrogen Safety.
0540	Head to SX
0615	AT SX waiting on RCTS
0715	RCT's on site, go pull rods and set well is the plan.
0730	begin well installation. Pull Rods back 4' to knock off Tip. (Decided to start on C8824)
0930	Tip off, Trip inner rods in with rivet shearing Tool and remove.
0930	inner rods out, pull 2 5/8" to 133 and add bentonite.
1000	Bentonite is at 133.94, Take lunch
1030	AT site, waiting for RCT's
1100	RCT on site. Called Kent about cementing. a decison was made to get everything ready and cement in the morning. Due to SB-50 work rest
1145	Rest (To Hot)
1215	Finish getting ready to do cement.
1300	Everything is ready to start cementing in the morning Go find steve and explain the plan for tomorrow.
1330	Head to office
1400	AT office do paper work
1430	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson
NCO: 7224
HPT: Jeff & Jim
FWS: Withrow

WEATHER: 98 F, sunny and hot. Winds will be from the south at 5 mph.

DOWNTIME: 2 hrs. - RCT

DISCARDED ITEMS: 2 5/8 - disposable Tip

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos

TITLE : ES TECHNICAL PREPARER

SIGNATURE: Olin Amos

REVIEWED BY: M. W. WALKER

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: M. W. Walker DATE: 08-09-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin well installation in boring #C8823 | DATE: 08-07-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 34

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: *Yes No* | *HHU CAT #2 HHU CAT #4 HHUXL#3*

BOREHOLE SUMMARY

Borehole # C8824 *Tubing (* 125 *)* @ 0 *to* 133 *ft bgs; S.U.* 8.0

Borehole # C8824 *Tubing (* 2 5/8 *)* @ 133.6 *to* 124.6 *ft bgs S.U.* 1.8

Borehole # _____ *Tubing (*) @ *to* *ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: Vacation Time.**
0545	Head to SX
0615	AT SX, waiting for RCT's
0700	RCT's on site, They say we have to go to Smeraff Bldg. To Acc in.
0730	Back at SX, POO, waiting for RCT's at site, PG
0800	RCT's on site, enter zone and get ready to cement
0830	Pull 2 5/8' pipe to 124. Set cement in hole and run in Stainless
1000	IH put us on a work rest of 15 and 45. could not quite because of cement being in the hole.
1110	well is (1¼ inch SS) in, setting in cement, clean up and go to lunch.
1130	lunch
1200	Enter site, relocate rig on C8825, check measurement and pickup
1230	on 50-50 work rest, shutdown, RCTS say we can't go back in after work rest. Rick Franzen allowed us to secure our site.
1300	Head to shop then the office
1430	End shift.
	NOTE: Set well @ 133 Feet
	Pulled pipe to 124.6
	NA

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson, Walkup
NCO: Rick
HPT: D.E.G.G
FWS: Withrow, Frazen

WEATHER: 97 F, mostly sunny and hot. Winds will be from the southwest at 5 mph.

DOWNTIME: 3. hrs. RCTS

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE: *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M.D. WALKER
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] DATE: 08-08-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Begin well installation in boring #C8825.		DATE: 08-08-13
LOCATION: "SX" Farm Stage III Soil Water Extraction	EXCAVATION: DAN-13- 0036R1 U-DIG # 13140541	REPORT #: 35
START CARD NO. SE48334	DECOMMISSION NO. AE22134	RWP: CO-762 Rev.3 SJHH-0080
SAMPLING SUMMARY Sample #'s Interval % 1. N/A 2. N/A 3. N/A 4. N/A	SITE/EQUIPMENT INSPECTION: (Yes) No	HHU CAT #2 HHU CAT #4 HHUXL#3

BOREHOLE SUMMARY

Borehole # ~~C8825~~ 2 Tubing (~~2 5/8~~) @ ~~12954~~ to ft bgs; S.U.

Borehole # ~~C8825~~ Tubing ( ) @ mud to ft bgs S.U.

Borehole # C8825 Tubing (2 7/8) @ 130 to 12954 ft bgs; S.U. 3

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: Concrete.**
0545	Head to smerf BDG. To ACE
0630	AT Site (SX), waiting for RCT's, Having a issue with Ace's, Cannot Ace in the day before. Have to Ace in the mornings,
0730	RCT's on Site, go to rig and move to C8825, setup do rig inspection. Pull pipe, Knock out Tip,
0825	Tip is out, run in ~~rest~~ sheer tool to clear hole
0905	sheer tool, out, get materials ready to set well after we pull pipe. and set Bentonite and Sand.
0937	IH Put us at 50-50 work rest Group meeting suggested getting everything ready to cement and do the cementing in the morning before we reach worktrest.
631	lunch, all is ready to cement in the morning
1100	Head to office. Stop by EKW. Down for cementing
1200	AT office, do reading
1430	End shift
	1. NOTE: moved rig to C8825, Pulled 2 5/8" to 132 from 138 add Bentonite.

N/A

OPERATOR/LICENSE: Amos/1224 ES SUPPORT: Steffler, Simpson NCO: Rick HPT: Jeff & Jim FWS: Withrow, Rick	WEATHER: 95 F, partly sunny. Winds will be from the south at 5-10 mph. DOWNTIME: 1 hr. RET 3.5 - cement	DISCARDED ITEMS: 1- Nylatron washer

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos	REVIEWED BY: M W WALKUP
TITLE : ES TECHNICAL PREPARER	TITLE: ES TECHNICAL REVIEWER
SIGNATURE: Olin Amos	SIGNATURE: [signature] DATE: 8-9-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue well installation in boring #C8825.

DATE: 08-09-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 36

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ~~C8825~~ Tubing (~~2 5/8~~) @ ~~2~~ to ~~121.97~~ ft bgs; S.U. ~~2.57~~

Borehole # C8825 Tubing (1¼) @ ~~0 +3.21~~ to 132.12 ft bgs S.U. 2.43

Borehole # C8825 Tubing ( ) @ 129.54 to 119.25 ft bgs; S.U. 1.29

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1 N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0530	Safety meeting at office. Topic: Electrical Power Cords.
0545	Head to SmerE to, Ace in,
0630	AT SX, waiting for POD
0715	on site, ~~25/8~~ RCT's here, set up to cement hole
0800	Begin cementing and install well (1¼ inch SS)
0920	End cementing 1¼" SS set at 132.1. Clean up site
1000	lunch
1030	AT SITE waiting for RCTs to move rig.
1130	RCT's on site, clean up and move rig to C8826
1145	Cannot move rig. We have to hold the 2⅝ with Rig until we get a wedding band or something to hold it in place, RCT's will be Leaving at 1:00 (on foot)
1200	Head to Ehin To get wedding band.
1245	Head to office. we will continue on Monday
1430	End shift
	NOTE: 1. C8825 - is complete with cement
	2. could not move rig until we get a wedding Band to hold the 2⅝" in place
	3. RCT's Left at 1:00,
	4. will move to C8826 on Monday
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson
NCO: Ron
HPT: Mike
FWS: Withrow

WEATHER: 96 F, partly sunny and hot. Winds will be from the east at ~5 mph.

DOWNTIME: 2.5 hrs. RCT

DISCARDED ITEMS: 1. 2⅝ disposable Tip

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olen Amos

TITLE: ES TECHNICAL PREPARER

SIGNATURE: Olen Amos

REVIEWED BY: M.W. WALKUP

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: M.W. Walkup DATE: 08-11-13

10/06/09 Rev I

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue with well installation on C8826 | **DATE:** 08-12-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 37

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* | *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8826 Tubing (2 5/8) @ 134.81 to 131.28 ft bgs; S.U. 1.3

Borehole # ____ Tubing ( ) @ ____ to ____ ft bgs; S.U.

Borehole # ____ Tubing ( ) @ ____ to ____ ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0530	Safety meeting at ES office, Topic: Take Safety With You On Vacation.
0545	Head to Smelter to Access in
0630	At SX, waiting for POD
0700	POD, discussed parking, Heat, notify Project Manage when leaving
0720	Head to site, move XL To C8826
0730	begin pulling pipe
0820	Pulled pipe 1 Foot, Tip out, run shearing tool
0910	Sheer tool out, rivets look good, add bentonite and Sand and pull 2 5/8" To 131.28, Bentonite 133.43
0945	Break for lunch
1100	RCT's on site, get ready to grout hole. Talking with IH, and Rick Franzen on work, rest. A decision was made to wait until morning to grout to avoid any problems with work, rest during grouting.
1130	Head to ENV to get wood clamps to use for a model at the machine shop. Go to machine shop and have clamps made up for SX. 2 5/8 Pipe
1335	At office, do paper work
1430	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Simpson
NCO: ,Villarreal
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Partly Sunny 93 degrees

DOWNTIME: 1 hr. RCTs

DISCARDED ITEMS:
4- Lynch Pins
1- 2 5/8 disposable tip

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. W. WALKER
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 08-12-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue with well installation on C8826 | **DATE:** 08-13-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT # 38**

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8826 Tubing (2 5/8) @ 131.28 to 123.25 ft bgs; S.U. 1.45

Borehole # C8826 Tubing (1 1/4") @ 0 to 132.4 ft bgs; S.U. 1.96

Borehole # C8823 Tubing (2 5/8) @ 143.8 to ~~137.9~~ 139.8 ft bgs; S.U. 1.4

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Industrial Ergonomics.
0615	Head to smerf Bld to Ace in
0700	POD, get warmed up and Tooling readyin. Rig inspection
0730	Get stuff ready to cement, pull 2 5/8" to 123.25
0800	Begin cementing sequence & run in 1 1/4" SS
0925	Stainless 1 1/4" in on bottom @ 132.4 move equipment and tooling to allow Access to ~~C8824~~ C8823.
0945	Need clamp to put on pipe before releasing clamps on rig. Called Ergott, he will pick them up while we eat.
1000	lunch: Ergott called said he broke down, I will need to meet him
1030	Go to office to meet Ergott and pickup 2 5/8" pipe clamps
1138	back on site, Put clamp on C8826 and move rig to C8823
1230	run shearing tool in to clear rivets of Tip holder
1250	Tool on bottom. IH made us exit zone for work, rest 50/50. Drink some water and put tooling away
1330	Head to office
1430	End shift
	Note: cemented C8826, moved to C8823.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Simpson
NCO: Sharpe, Rivearea
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Partly Sunny 93 degrees

DOWNTIME: IH - 50 - 50

DISCARDED ITEMS: 1 - 2 5/8" disposable Tip

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. W. Wilkes
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] DATE: 08-16-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue with well installation on C8826 | **DATE:** 08-14-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT # 39**

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* | *HHU CAT #2* | (HHUXL#3)

BOREHOLE SUMMARY

Borehole # C8823 Tubing (2 5/8) @ to 139.8 123.0 ft bgs; S.U. 1.5

Borehole # C8822 Tubing (1 1/4) @ 0 to 133.14 ft bgs; S.U. 3,4

Borehole # - Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic: WRPS Heat Stress Control Procedure. (Pgs 1 through 5)
0615	Head to smerf to ace in, read and sign RWP Rev 4
0645	At SX, waiting for POD, 7:15
0730	At site, waiting for RCT
0745	RCT's on site, pull inner rod with shearing tool out Pull 2 5/8" to add bentonite.
0840	Pipe at 131 Feet, get all ready to cement Then pull To 124.
0930	Begin
1040	cementing complete. 1 1/4 inch ss set at 133.14, cleanup
1100	lunch
1130	waiting for RCTS
1200	RCTS on site survey equipment out of zone. clean up site to get ready for testing
1235	Shut down. Head to EMW to get supplies for falling Head test.
1430	End shift
	NOTE: All cementing has been completed on C8823, 24, 25, 26. Begin testing tomorrow N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Ehrgott, Simpson
NCO: Sharpe, Riviera
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Partly Sunny 93 degrees

DOWNTIME: 1-hr RCT's

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M.W. Withrow
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 8-16-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue with well installation on C8823 and do development on C8826 | **DATE:** 08-15-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 40

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.3 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: Yes (No) | *HHU CASE#1* | *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ____	Tubing ( ) @	to	ft bgs; S.U.
Borehole # N/A	Tubing ( ) @	to	ft bgs; S.U.
Borehole # ____	Tubing ( ) @	to	ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: WRPS Heat Stress Control Procedure. (Pgs 6 through 15)
0615	Head to SX
0645	waiting for POD AT SX trailer
0715	RCT's on site, get ready for falling head test on C8826
0815	Begin Falling head test, poor 3 gallons of water in, water burped out because of air trapped in well (1¼) Test 1
0900	Gear up to develope C8826 by surging
0935	Begin Surging well, bailing water to pre form another Falling head test
1130	lunch
1200	Begin Falling head test on C8826
1300	RCT chased us out of zone, we will let the falling itead test overnight.
1320	Itead to office.
1430	End shift.
	note: did falling Head test, and one round of surging (45 mins) on C8826, also began another Falling head test which will run through the night.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Ehrgott, Simpson
NCO: Sharpe, Riviera
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Partly Sunny 93 degrees

DOWNTIME: .5 - RCTs

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M.W. WALKUP
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 08-16-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation.

DATE: 08-16-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 41

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 4 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole #_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #_____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: WRPS Heat Stress Control Procedure. (Pgs 6 through 15)
0615	Head to sweet D10. To Ace.
0645	At SX waiting for pad
0700	On site waiting for RCT's and operators
0730	Enter site (support on site) prepare for surging
0800	Surging C8826, Test all packers 100%. Holding air
0845	End surging, pump out water
0905	Begin Falling head test #2
0930	Begin Surging
0945	Surging on C8826
1023	Pump on
1040	Falling head test #3
1100	lunch
1130	move to C8825 and do Pre test
1210	Begin surging on C8825.
1255	Pump on well to extract water
1305	Falling head test on C8825 #1, leave over the weekend.
1330	Head to office
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Walkup, Simpson
NCO: Sharpe, Riviera
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Partly Sunny 93 degrees

DOWNTIME: .5 - RCT's

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. W. Wilkins
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 8-27-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation

DATE: 08-19-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 42

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 34 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # _____ Tubing (N/A @ to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0530	Safety meeting at office. Topic: Distracted and Dozing.
0555	TRAVEL TO SMART AND "ACE".
0635	TRAVEL TO "SX" FARM.
0645	ONSITE AT "SX" FARM. STAND BY FOR P.C.D AND HPT'S.
0715	HPT'S ONSITE. P.C.D. BY R. FRANZEN
0720	MOVE BACK TO # C8826 AND PREPARE FOR SURGING
0815	HAND SURGE FOR 3 MINUTES MACHINE SURGE FOR ½ MINUTES
0850	END SURGING AND PUMP OUT WATER.
0920	ALTERNATE HAND AND MACHINE SURGING.
0954	STARTED FALLING HEAD TEST #4.
1000	LUNCH.
1030	ALTERNATE HAND AND MACHINE SURGING.
1145	END SURGING AND PUMP OUT WATER.
1150	ALTERNATE HAND AND MACHINE SURGING.
1215	END SURGING AND PUMP OUT WATER.
1239	STARTED FALLING HEAD #5. WILL LET RUN OVERNIGHT.
1300	SECURED SITE. TRAVELED TO ENW9 OFFICE.
1345	COMPLETED PAPERWORK AND TIMECARD.
1400	END OF SHIFT.

N/A

OPERATOR/LICENSE: Walkup/3005
ES SUPPORT: Steffler, Simpson
NCO: VILLARREAL, RIVERA
HPT: CRAYTON, COX
FWS: ~~Withrow~~ MW FRANZEN

WEATHER: 94 F, mostly sunny with winds from the southwest at 5-10 mph.

DOWNTIME:
1/2 HR. HPT'S

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: J.W. WALKUP
TITLE: ES TECHNICAL PREPARER
SIGNATURE: [signature]

REVIEWED BY: MIKE EMMOTT
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: Mike Emmott DATE: 08-21-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation

DATE: 08-20-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 43

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 84 (MW) SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ N/A to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: Buckle Up And Live.**
0545	Travel to Smurf building and "ACE".
0620	Travel to "SX" Farm.
0630	Onsite at "SX" Farm. Standby for P.O.D. and HPT's.
0730	HPT's onsite. P.O.D. by R. Franzen WRPS.
0800	STARTED FALLING HEAD TEST #6
0914	ALTERNATE HAND AND MACHINE SLUGGING.
1009	END SLUGGING AND PURGE OUT WATER.
1030	LUNCH.
1100	PULL PUMP & PREP. FOR FALLING HEAD TEST.
1120	STARTED FALLING HEAD TEST #7 (PER R. SIMPSON #7 VS NOW KNOWN AS #8)
1143	START PUMPING WATER OUT OF #C8836 TO CLEAR SEDIMENT.
1300	STOPPED PUMPING, SECURED SITE AND TRAVELED TO OFFICE.
1345	COMPLETED PAPERWORK AND TIMECARD.
1400	END OF SHIFT.

N/A

OPERATOR/LICENSE: Walkup/3005
ES SUPPORT: Steffler, Simpson
NCO: RIVERA, RICHTER
HPT: CLAYTON, MINCY
FWS: Franzen

WEATHER: 89 F, mostly sunny with winds from the northwest at 5-10 mph.

DOWNTIME:
30 MINUTES FOR HPT'S

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: M.W. WALKUP
TITLE: ES TECHNICAL PREPARER
SIGNATURE: [signature]

REVIEWED BY: MIKE ENRIGHT
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 8-27-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation | DATE: 08-21-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 44

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No | HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY
Borehole # _____ Tubing ( ) @ to ft bgs; S.U.
Borehole # _____ Tubing ( ) @ to ft bgs S.U.
Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING
Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: The Intersection Problem.**
0635	Travel to Smurf building and "ACE".
0636	Travel to "SX" Farm.
0640	Onsite at "SX" Farm. Standby for P.O.D. and HPT's.
0710	HPT's onsite. P.O.D. by R. Franzen WRPS.
0730	RECONFIGURED PUMP AND HOSE
0745	STARTED PUMPING. ONLY ABLE TO PUMP WATER. QUIT PUMPING.
0950	RECHECKED DEPTHS AND ASBUILTS ON ALL 4 WELLS. IT APPEARS
—	THAT THERE MIGHT BE ~3' OF CEMENT IN SUMP. DECISION WAS MADE BY
—	K. REYNOLDS TO RUN PIPE IN AND SEE IF WE CAN PULL A PLUG FROM THE
—	INSIDE OF THE 1" SUMP.
1030	LUNCH.
1100	STANDBY FOR HPT.
1130	PULL PUMP.
1135	STANDBY FOR DECISION IF SITE NEEDS TO BE "CA"
1150	RUN 3/4" PIPE IN AND TRY TO GET SAMPLE OF FILL MATERIAL. NO SAMPLE
1245	PULL PIPE, CUT MULE SHOE AND RUN PIPE IN. WERE ABLE TO GET PIPE
—	~4' INTO FILL. PULLED PIPE. SMALL AMOUNT OF FILL RECOVERED.
1345	SECURED SITE AND TRAVELED TO OFFICE.
1520	COMPLETED PAPERWORK AND TIME CARDS.
1400	END OF SHIFT.
	N/A

OPERATOR/LICENSE: Walkup/3005
ES SUPPORT: Steffler, Simpson
NCO: RUMBAA, RICHTER
HPT: CLAYTON, MINCY
FWS: Franzen

WEATHER: 92 F, partly sunny with winds from the southwest at 5-10 mph.

DOWNTIME: 1 HR. HPT'S

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: M.W. WALKUP
TITLE: ES TECHNICAL PREPARER
SIGNATURE: [signature]

REVIEWED BY: MIKE ELLIOTT
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 8-27-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation

DATE: 08-22-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 45

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2. N/A
3. N/A
4. N/A

SITE EQUIPMENT INSPECTION: (Yes) No

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to N/A ft bgs; S.U.
Borehole # _____ Tubing ( ) @ to ft bgs S.U.
Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: Construction Work Zones.**
0545	Travel to 200W and meet with Jim Geiger CHPRC and pick up hydrostar rod for cleanout of boring #C8826.
0635	Travel to "SX" Farm.
0640	Onsite at "SX" Farm.
0645	STANDBY FOR HPT'S
0750	HPT'S ONSITE. P.O.B. ONSITE AS MOSLD BY R. FRANZEN FWS WRPS.
—	DISCUSSED GETTING UP "CA", WHITES AND RAINGEAR.
0840	PICKED UP WHITES AT "SX" AND WENT TO SITE.
0850	ENTERED SITE BEFORE BEING POSTED AND RE-MEASURED ALL 4 WELLS.
0900	STANDBY FOR WORK PACKAGE TO BE RETURNED FROM "SMART".
1030	LUNCH.
1100	RUN HYDROSTAR TUBING AND CLEANOUT TOOL IN. PUSHED TO 7"
—	INTO FILL. UNABLE TO PUMP ON WELL DUE TO PUMP
1200	STANDBY FOR RWP. SECURED SITE AND TRAVELED TO OFFICE
1245	COMPLETED PAPERWORK AND TIMECARD.
1400	END OF SHIFT.

N/A

OPERATOR/LICENSE: Walkup/3005
ES SUPPORT: Steffler, Simpson
NCO: SHARP, MARCH
HPT: CLAYTON, MINCY
FWS: Franzen

WEATHER: 96 F, partly cloudy with winds from the north at 5-10 mph.

DOWNTIME:
1 HR. 5 MINUTES - HPT'S
3 1/2 HRS. - PUMP REVISION

DISCARDED ITEMS:
N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: M. W. WALKUP
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Mike Walkup

REVIEWED BY: MIKE EHRGOTT
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: Mike Ehrgott DATE: 8-27-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation | DATE: 08-23-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 46

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev. 4 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE EQUIPMENT INSPECTION: (Yes) No | HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to N/A ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1. N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: Defensive Driving.**
0615	Travel to "SX" Tank Farm.
0645	Onsite at "SX" Tank Farm. Standby for ~~RWP revision~~ (NEW) HPT's
0700	P.C.'s BY R. FRANZEN FOR WORK. DISCUSSED CHANGE TO RWP
0720	ENTERED SITE, CONTINUED CLEAN-OUT OF WELL # C8826.
1035	LUNCH.
1105	CONTINUED CLEAN-OUT OF WELL # C8826. CLEARED OUT 1.2' OF FILL
—	FOR SHIFT.
1250	SECURED SITE AND TRAVELED TO OFFICE
1340	COMPLETED PAPER-WORK AND TIMECARD.
1400	END OF SHIFT.

N/A

OPERATOR/LICENSE: Walkup/3005
ES SUPPORT: Steffler, Simpson
NCO: RIVERA
HPT: MARSHALL
FWS: Franzen

WEATHER: 91 F, mostly cloudy with a chance of thunderstorms. Winds from the southwest at 10-15 mph.

DOWNTIME: 35 MINUTES - HPT'S

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: M.W. Walkup
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Mike Walkup

REVIEWED BY: MIKE EHRGOTT
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: Mike Ehrgott DATE: 8-27-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation | DATE: 08-26-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 47

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: Yes (No) | HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.
Borehole # ____ Tubing ( ) @ to ft bgs S.U.
Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: PPE Protection.**
0600	Head to SWMU 36D to Ace in
0630	Access is down, (waiting)
0700	Access is up, Ace in head to SX
0712	AT SX, waiting for POP
0753	on site at hole, Had POP, Begin hole development on C9826
1300	chipping away at what seems to be cement in the hole, Rap Pump water out, Not getting anywhere.
1100	lunch, Using hydro-star rod to try and remove material.
1130	waiting for RCTs
1215	RCT on site, continue testing
1316	RCT makes us leave site. Head to office
1430	End shift
	NOTE: 1. Surged and purged on C9826, Trying to get what appears to be cement inside 1" SS.
	2. Ran Hydro star rods down C9825 to check for cement. looks like 4.7 feet inside.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson, Walkup
NCO: Ruben
HPT: Mike
FWS: Franzen

WEATHER: 87 F, partly sunny with winds from the south at 10-15 mph.

DOWNTIME: 4 hrs. - RCT's

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M. W. WALKUP
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 8-27-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation | DATE: 08-27-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 48

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

N/A

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0530	Safety meeting at office. Topic: Sprains And Strains In The Construction Industry.
0545	Head to SX
0615	waiting for POC
0700	POC. AT Site, (Be safe)
0715	Begin Surge & Purge on C9916
0742	Stop Surge begin pumping out water
0826	Begin Falling head Test #9
0855	Begin Surging
0933	Pump on
1023	Pump off, go to lunch
1030	lunch
1100	waiting RCT's.
1200	RCT on site.
1207	Begin Surging Sequence
1272	Begin Pumping
1257	Begin Falling head test number #10. (Let run overnight)
1330	RCT's ran us out of Zone, Head to office
1400	Paper work
1430	End shift
	NOTE: i. Surged and purged on C9826 and did Two Falling head tests.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson, Walkup
NCO: Ruben, Sharp
HPT: Joey, Pat
FWS: Franzen

WEATHER: 90 F, mostly sunny with winds from the east at 5-10 mph.

DOWNTIME: 2.5 hrs. RCTS

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M. W Walkup
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: _____ DATE: 8-29-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation | DATE: 08-28-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 49

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: Yes (No) | HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

Borehole # ____ Tubing ( ) @ to ft bgs S.U.

Borehole # ____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1. N/A
2. N/A
3. N/A

TIME	WORK SUMMARY
0530	Safety meeting at office. Topic: Clothing For Construction.
0545	Head to Aces station
0615	At Aces
0630	At SX waiting for POD (RCT's)
0730	RCTs on site, POD.
0744	Surge on C9826
0820	Pump on "
0832	Pump off
0840	Falling head test #11 on C9826
0900	move to C9825 and try drilling and chipping at the cement
0930	not advancing, switch to surging
1017	Surging C9825
1046	End surging, go to SX lunch room
1100	lunch
1130	waiting on RCT's.
1230	RCT's on site, Pull surge tool and install pump
1232	Pump on
1257	Begin Falling head test #2 on C9825, Let run over night
1315	Head to office
1430	End Shift
	NOTE: 1. Surge & purged C9826, Falling head test #11 on C9826,
	2. Surge & Purged C9825, Falling Head test #2 (No Sediment

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson, Walkup
NCO: Sharp
HPT: PAT & Ceasar
FWS: Franzen

WEATHER: 91 F, mostly sunny with winds from the southwest at 5-10 mph.

DOWNTIME: 3 hrs. RCT

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: M. D. Walkup
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: M. D. Walkup DATE: 8-29-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation | DATE: 08-29-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 50

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: *Yes No* | *HHU CAT #2 HHU CAT #4 HHUXL#3*

BOREHOLE SUMMARY

Borehole # ~~—~~ *Tubing ( ) @ to ft bgs; S.U.*

Borehole # — *Tubing ( ) @ to ft bgs S.U.*

Borehole # — *Tubing ( ) @ to ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring # Interval Type

1.N/A

2 N/A

3 N/A

TIME	WORK SUMMARY
0530	**Safety meeting at office. Topic: Flammable Liquids.**
0545	Head to SX
0615	AT SX waiting for POP
0720	POP; (Driving Awareness - Safety topic)
0720	Start Surging on C8825
0900	Start Pumping, Having trouble getting the water out of C8825, change out foot valve, change out tubing to get the water out
1024	Start Falling head test at ~~1020~~ 1024 on C8825, Test #3
1100	lunch
1130	Complete Falling head test while waiting for Kents call to move
1245	Kent called said to move to C8823
1250	Begin Falling head test on C8823
1315	Head to office
1430	End shift
	Note: A. Performed Falling head test #3, Surged, and purged on C8825 (no sediment)
	B. Performed Falling head test on C8823 #1 (no sediment)
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson, Walkup
NCO: Sharp
HPT: Pat, Crasor
FWS: Franzen

WEATHER: 90 F, partly sunny with light and variable winds.

DOWNTIME: 1 hr. RLTs

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olivia Amos
TITLE: ES TECHNICAL PREPARER
SIGNATURE: Olivia Amos

REVIEWED BY: M.W. WALKUP
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: [signature] DATE: 9-4-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation.

DATE: 08-30-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 51

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ~~C8823~~ Tubing ( ) @ to ft bgs; S.U.

Borehole # ~~C8823~~ Tubing ( ) @ to ft bgs; S.U.

Borehole # ~~C8823~~ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: What To Do In Case Of Fire
0610	Head to Aces
0700	AT SX waiting on POD
0730	AT Site, set up to start surging C8823
0745	Surging on C8823
0824	Pumping on C8823
1030	Falling head test #2 on C8823
1100	lunch
1130	Back at rig Surge C8823
1201	Pumping water out of C8823
1234	Falling head test #3 on C8823, Let run overnight
1300	Head to office
1430	End shift
	Note: Completed two cycles of Surging, pumping and falling head test on C8823.
	a. No sediment in sump
	b. 3/4 of a gallon of sediment out of formation
	NA

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Simpson
NCO: Sharpe, Riviera
HPT: ~~Clayton~~ Pat,
FWS: Franzan, Withrow

WEATHER: Partly Sunny 89 degrees

DOWNTIME: .5 - RCT

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M. W. Withrow
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 9-4-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation.

DATE: 09-03-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 52

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ~~C8823~~ Tubing ( ) @ to ft bgs; S.U.

Borehole # C8823 Tubing ( ) @ to ft bgs; S.U.

Borehole # ~~C8823~~ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic: Work Clothes And Safety
0615	Head to 200 East Aces station
0645	at Aces,
0700	Head to SX POD
0730	On Site, set up to Surge + Purge
0745	Surging C8823
0825	Pumping C8823
0854	Surging C8823
0908	pumping C8823
1011	Falling head Test #4 on C8823
1030	lunch
1100	Head to office C shutdown for WRPS all hands meeting.)
1430	End shift
	NOTE: Surge and purged C8823, Falling head test .5 gallons formation sediment removed

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Simpson
NCO: Sharpe, Riviera
HPT: ~~Clayton~~
FWS: Franzan, Withrow

WEATHER: Partly Sunny 89 degrees

DOWNTIME: 2.5 hrs. All Hands MTG.

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: M.D. WALKUP
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 9-4-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation | DATE: 09-04-13

LOCATION: "SX" Farm Stage III Soil Water Extraction | EXCAVATION: DAN-13- 0036R1, U-DIG # 13140541 | REPORT #: 53

START CARD NO. SE48334 | DECOMMISSION NO. AE22134 | RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY
Sample #'s Interval %
1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: Yes (No) | HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.
Borehole # ___ Tubing ( ) @ to ft bgs S.U.
Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type
1.N/A
2 N/A
3 N/A

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Serious Injuries.
0615	Head to Aces
0645	AT Aces, Ace in and head to SX
0700	AT SX POD
0715	AT Site, setup on C8824 (completed Falling head test #4 C8823
0746	Falling Head test #1 on C8824
0813	Surging C8824
0843	Pumping C8824
0946	Falling Head test #2 on C8824
1010	Surging
1040	Lunch
1115	Back at rig set up to purge hole(C8824)
1135	Pump on at C8824
1202	Falling Head test #3 on C8824
1225	Surging on C8824
1256	Pumping C8824
1319	Falling Head test #4 on C8824
1330	Head to office
1430	End shift
	NOTE A: Finished Falling head test #4 on C8823
	B: completed Falling head test #3, 2, 1 on C8824
	C: Began Falling head test #4 on C8824
	D: 1-Pint of sediment removed from C8824 after 3 surge cycles

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson, Walkup
NCO: RON, D. Daniels
HPT: ~~Pat~~
FWS: Franzen

WEATHER: 91 F, partly sunny with light and variable winds.

DOWNTIME: 0

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos
TITLE : ES TECHNICAL PREPARER
SIGNATURE: Olin Amos

REVIEWED BY: MIKE EHRBOTT
TITLE: ES TECHNICAL REVIEWER
SIGNATURE: Mike Ehrbott DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation

DATE: 09-05-13

LOCATION: "SX" Farm Stage III Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT #: 54

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.5 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CAT #2 HHU CAT #4 (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

Borehole # ___ Tubing ( ) @ to ft bgs S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.N/A		
2 N/A		
3 N/A		

TIME	WORK SUMMARY
0600	Safety meeting at office. Topic: Weather.
0615	Head to SX
0645	AT SX for POD
0700	POD. Finish Falling head test #4 and waiting for direction from Kent, Pick up site and get XL Surveyed.
0825	Kent called quits. Get material out of zone
0910	equipment all out except Rig. waiting for RCT's to Survey Rig
1030	lunch
1100	Take equipment to EMW. Still waiting for Rig Survey
1430	End of shift
	NOTE: A. Completed Falling Head test #4
	B. Get equipment out of zone.
	C. All equipment is out except drill XL #3

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: Steffler, Simpson, Walkup
NCO: Rick, Ruben
HPT: Pat + DAN
FWS: Franzen

WEATHER: 88 F, chance of thunderstorms, large hail and heavy rain.

DOWNTIME: -0-

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN-13- 000390

REPORT BY: Olin Amos

TITLE: ES TECHNICAL PREPARER

SIGNATURE: Olin Amos

REVIEWED BY: MIKE EHRGOTT

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: Mike Ehrgott DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Continue Falling Head Testing and Borehole Manipulation.

DATE: 09-06-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 55

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.4 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Safe Use of Compressed Gas Cylinders.
0615	Head to ACES
0645	Aced in, head to SX
0700	At SX, POD (gas can safety)
0730	Hook up trailer and take to EMW, RCT's are do survey on XL
0900	At EMW, unload equipment from SX
0945	Head to SX to move XL to the top of the hill for Pickup on Monday
1030	lunch
1100	Move Rig to the top.
1145	Head to EMW
1235	Head to office
1430	End of shift.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Simpson
NCO: Sharpe, Riviera
HPT: Clayton
FWS: Franzan, Withrow

WEATHER: Partly Sunny 89 degrees

DOWNTIME: 0

DISCARDED ITEMS: ———

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Ames

TITLE: *ES TECHNICAL PREPARER*

SIGNATURE: Olin Ames

REVIEWED BY: MIKE EHRGOTT

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: Mike Ehrgott **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: De-Mob Rig#3 and support equipment.

DATE: 09-09-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 56

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.5 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 *HHU CAT #2* *(HHUXL#3)*

BOREHOLE SUMMARY

Borehole # — Tubing ( ) @ to ft bgs; S.U.

Borehole # — Tubing ( ) @ to ft bgs; S.U.

Borehole # — Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic: Power Tool Safety
0700	Head to SX to load XL
0930	No Truck yet, call Eggett to locate truck
0960	Mike said truck was running late, should be here soon
1150	Truck here, load up and take XL To Shop
1220	At Shop unload XL and head to office
1430	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos
NCO: Sharpe, Riviera
HPT: ~~Clayton~~
FWS: Franzan, Withrow

WEATHER: Partly Sunny 89 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: MIKE EMMOTT
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: Mike Emmott **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Install surface treatments to wells.

DATE: 09-10-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 57

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.5 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # ~ Tubing ( ) @ to ft bgs; S.U.

Borehole # ~ Tubing ( ) @ to ft bgs; S.U.

Borehole # ~ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Good Hygiene on the Job
0630	Head to ENW to Service XL
0700	AT ENW checking accumulators, Chain out winch line, Out of Nitrogen
0945	Head to SX to put adapter on 1" SS
11:40	lunch
1210	Head to ENW and get nitrogen bottle and take to Town to get new one.
1400	At office
1430	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler
NCO: Sharpe, Riviera
HPT: ~
FWS: Franzan, Withrow

WEATHER: Partly Sunny 89 degrees

DOWNTIME: 0

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: MIKE EHRBOTT
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: Mike Ehrbott **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Maintenance, inspection, and repair at ENW (Rig #3)

DATE: 09-11-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 58

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.5 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* (HHUXL#3)

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Why Should You Improve Your Driving Skills.
0640	Head to whole body
0715	Head to office, Pickup the shovel and head to shop. get XL ready to go. Check Accumulators
1100	lunch
1130	work on XL
1430	End shift.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Ehrgott
NCO: —
HPT: —
FWS: Franzan, —

WEATHER: Partly Sunny 89 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Ames
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Ames

REVIEWED BY: MIKE EHRGOTT
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: Mike Ehrgott DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Stand-by for C8823 Well Head Surface Treatment Fitting...Install when received.

DATE: 09-12-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 59

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.5 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes (No)

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

Borehole # ___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Which Driver Are You
0630	Stand-By for C8823 Well Head Surface Treatment fitting.
1000	Put well head fitting on C8823 for Surface Treatment.
1030	Head to yard (Enw)
1100	Lunch
1130	END SHIFT (Job Complete)

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Steffler, Ehrgott
NCO:
HPT:
FWS: Franzan,

WEATHER: Partly Sunny 89 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Lo Amos

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: L A. Amos

REVIEWED BY: MIKE EHRGOTT

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: Mike Ehrgott **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Set pump in C8823 and take blank samples

DATE: 10/7/13

LOCATION: "SX" Farm Stage 3 Water Extraction

EXCAVATION: DAN-13- 0094
U-DIG # 13140270

REPORT # 60

START CARD NO. SE48335

DECOMMISSION NO. AE22135

RWP: CO-762 ~~Rev.5~~ Rev 6 RJS 10 7-13 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. B2T085	Equip. Blank	
2.		
3.		
4.		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHUCASE#1, HHUCAT#2, HHUXL#3
HHUCAT #4

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ NA to ft bgs; S.U.
Borehole # _____ Tubing ( ) @ to ft bgs; S.U.
Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1	NA	
2		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Protecting Occupants
0800	Aced in at 2704 HV
0835	Pre job. Generators, noise, rad. powderys were main topics.
0909	Pre job complete. Waiting on electricians.
0925	CEES on site setting up trailer + equipment.
1018	Filled mock sump and started bladder pump
1033	Filled sampler through sample port.
1048	Tagged C8823 and determined location of placement of pump and transducer. Placement of transducer was approximately 3 ft. above the pump screen. Placement was determined by CEES representative. (Colin Henderson)
1200	Lunch.
1312	Delivered and relinquished samples to Todd Steele at 222-S.
1420	Returned to E.S. for paperwork.
	NOTE: Its been determined that logging the sample event in a logbook is not necessary. The equipment blank was taken using 222-S lab furnished DI water, placing it in a mock sump (PVC) and pumping it through the tubing prior to the sample port. The same bladder pump was then installed in C8823, ± 1 inch off the bottom.
	Sample # B2T085, C.o.C # V13-006-003. Cooler # TFVS-09-007
	N/A

OPERATOR/LICENSE: Ehrgott/3115
ES SUPPORT, Steffler/Ehrgott/Amos
NCO: Kirsch
HPT: Mincey, Nunez
FWS: Franzen

WEATHER: Clear / Windy

DOWNTIME: None

DISCARDED ITEMS: None

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2461 GG-NW-FA-PR-001 ECN- 13-000410

REPORT BY: R.J. Steffler Ray J Steffler
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: R.J. Steffler

REVIEWED BY: MIKE EHRGOTT
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: Mike Ehrgott **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Add bentonite pellets above packer C8823 | **DATE:** 10-23-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 61

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # C8823 Tubing (–) @ – to – ft bgs; S.U. –

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: In Car Distractions.
1245	TRAVEL TO ~~SMURF~~ SX- MO 563 WITH BENTONITE & STEEL TAG TAPE
1315	PRE-JOB BY R. FRANZEN DISCUSS ADDING BENTONITE ABOVE PACKER AT WELL C8823 TO CREAT A SEAL.
1340	C8823 TAG AT ~128.65' bgs, ADDED 1/4" COATED BENTONITE
—	PELLETS, FROM ~128.65' bgs TO ~125.85 bgs (2.8') (~ 7 CUPS)
—	~ 0.72' ABOVE PACKER. ADD 1/2 gal OF DISTILLED WATER.
—	TO HYDRATE PELLETS. WILL LET SET OVER NIGHT
—	AND CHECK IN MORNING.
1450	LEAVING SITE FOR ES OFFICE.
1530	ARRIVED AT ES OFFICE, COMPLETE PAPER WORK.
1690	END OF SHIFT NOTE: SEE ATTACHED PAPER WORK

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Weakley, Ehrgott
NCO: SNOOK
HPT: KENNEDY
FWS: Franzan,

WEATHER: Sunny 65 degrees

DOWNTIME: NONE

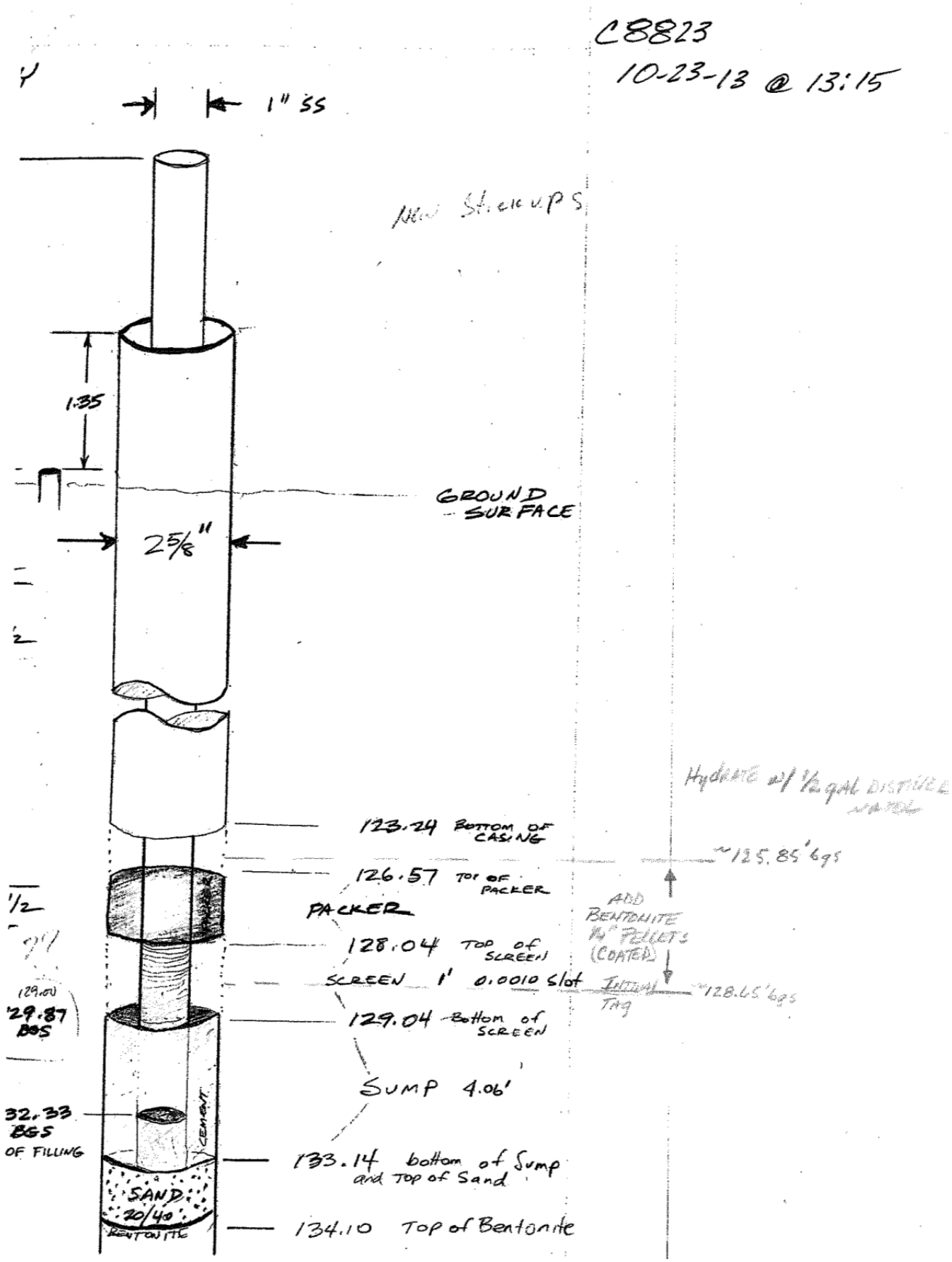
DISCARDED ITEMS: ~ 7 CUPS 1/4" BENTONITE COATED PELLETS

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: Dopes
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1


C8823
10-23-13 @ 13:15
1" SS
1.35
GROUND SURFACE
2 5/8"
123.24 BOTTOM OF CASING
126.57 TOP OF PACKER
PACKER
128.04 TOP of SCREEN
SCREEN 1' 0.0010 Slot
129.04 Bottom of SCREEN
SUMP 4.06'
32.33 BGS OF FILLING
CEMENT
133.14 bottom of Sump and Top of Sand
SAND 20/40
134.10 Top of Bentonite
ADD BENTONITE 1/4" PELLETS (COATED)
INITIAL TAG
~128.65' bgs
~125.85' bgs

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Add bentonite pellets above packer C8823

DATE: 10-24-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 62

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # C8823 Tubing (2 5/8") @ — to — ft bgs; S.U. —

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Driving After Dark.
0730	TRAVEL TO SMURF Bldg. TO ACE-IN.
0815	PRE-JOB by R. FRANZEN (FWS).
—	RUN STEEL TAG TAPE DOWN TAGGED AT ~ 126.15 bgs
—	ADDED 0.50' OF 1/4" COATED BENTONITE PELLETS (PER K. Rambo)
—	AND HydRATE WITH 1/2 gal OF DISTILLED WATER. TAG TOP
—	OF BENTONITE PELLETS AT ~ 125.65 bgs.
0930	TASK COMPLETED HERE. TRAVEL TO TX-FARM AND CONTINUE
—	WITH WORK. SEE ATTACHED PAPER WORK

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Weakley, Ehrgott
NCO: CHRIS, Ron
HPT: PATRICK.
FWS: Franzan,

WEATHER: Sunny 65 degrees

DOWNTIME: NONE

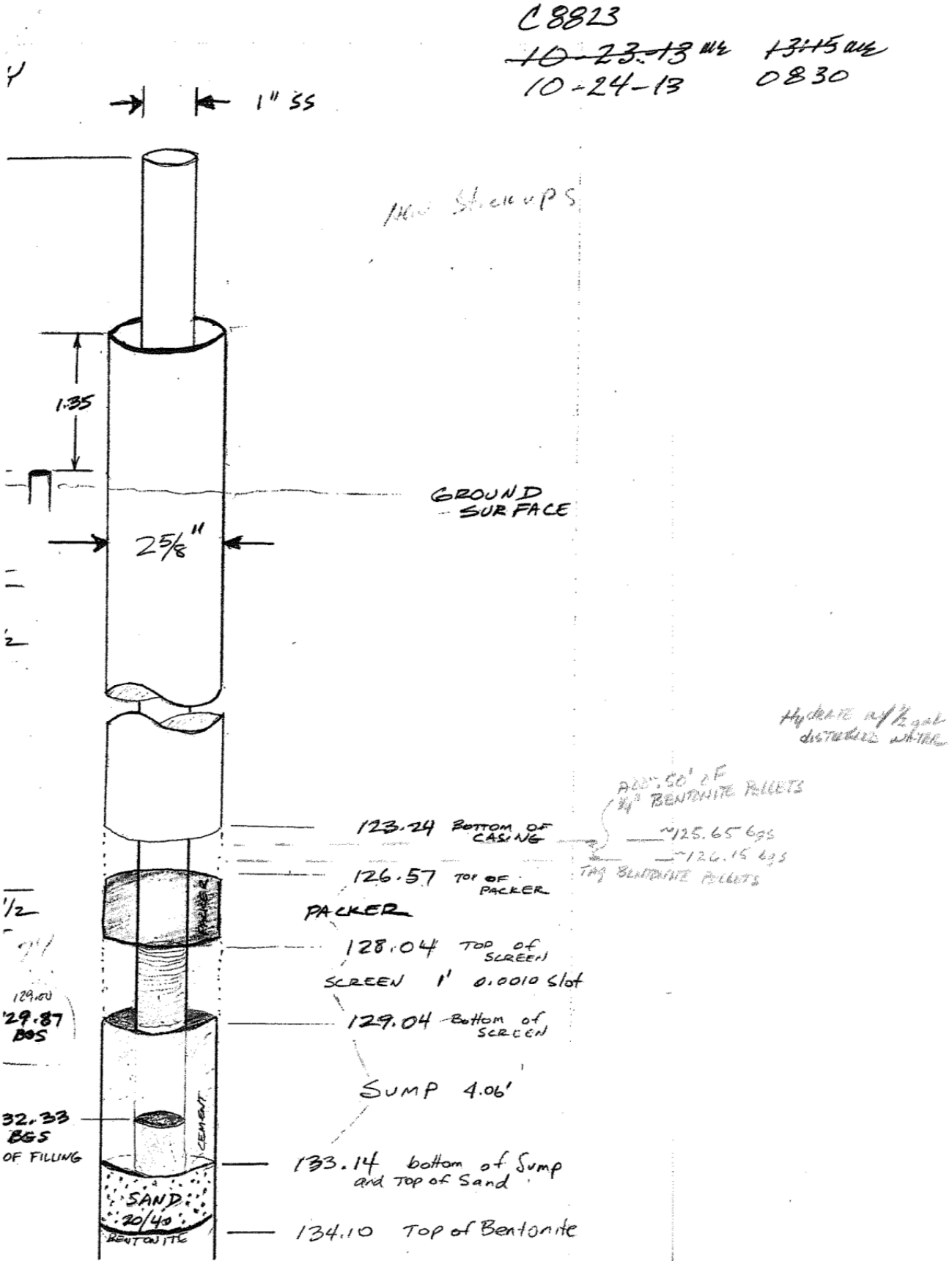
DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1


C8823
10-24-13
0830
1" SS
1.35
GROUND SURFACE
25/8"
Hydrate w/ 1/2 gal distilled water
Add. 50' of 1/4" BENTONITE PELLETS
~125.65 bgs
~126.15 bgs
TMJ BENTONITE PELLETS
123.24 BOTTOM OF CASING
126.57 TOP OF PACKER
PACKER
128.04 TOP of SCREEN
SCREEN 1' 0.0010 Slot
129.87 BOS
129.04 Bottom of SCREEN
SUMP 4.06'
32.33 BGS OF FILLING
CEMENT
133.14 bottom of Sump and Top of Sand
SAND 20/40
BENTONITE
134.10 Top of Bentonite

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Routines | **DATE:** 10-30-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 63

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic: Driving in Snow and Ice.
0725	TRAVEL TO SX-FARM, ACE-IN HT SMURF bldg.
0800	PRE-JOB by FWS R. FRANZEN
0900	START ROUTINES FOR WATER EXTRACTION (DAILY ROUTINES)
1000	ROUTINES COMPLETED LEAVING SITE FOR ES OFFICE.
1040	ARRIVE AT ES OFFICE, PAPER WORK
1100	LUNCH
1130	TRAVEL TO ENW TAKE MEASUREMENTS FOR Rig #4
—	FOR Building Hydraulic Hose Carrier.
—	ORDER PARTS FOR BLUE AIR COMPRESSOR.
—	WORKING ON TX-CODE TEST OF DAY.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT: ~~Amos,~~ Weakley, Ehrgott
NCO: ENOOK
HPT: LEWSEY
FWS: Franzan,

WEATHER: Sunny 65 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Move Pump from C8823 to C8824

DATE: 11-07-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 64

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Unloading and Loading SAFELY.
0715	TRAVEL TO SMURF Building AGE-IN.
0800	ARRIVE ON SITE FOR P.O.D. AT M.O.563
0835	TRAVEL TO SITE.
—	REMOVE BLADDER PUMP FROM C8823, INSTALL A NEW
—	BLADDER PUMP... THAT THE CEES HAS AFTER TESTING
—	PUMP IN WATER, TAGGED SUMP @ 133.03 bgs (Bottom).
—	NCO's SUPPORTED MOVING EXTRACTION EQUIPMENT TO
—	C8824 USED SILICON TO SEAL Pkg. AND AROUND TAPE
—	WITH TRANSDUCER.
1100	COMPLETED TASK... PUMP WILL BE STARTED ON MONDAY.
1115	LEAVING WORK SITE FOR E.S. OFFICE.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Ehrgott
NCO: Reveley, Nathan, Ron
HPT: Mincy
FWS: Franzan,

WEATHER: Cloudy W/Rain 57 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Take sample from sample trailer		**DATE:** 11-11-13
LOCATION: "SX" Farm Stage 3 Soil Water Extraction	**EXCAVATION:** DAN-13- 0036R1 **U-DIG #** 13140541	**REPORT #** 65
START CARD NO. SE48334	**DECOMMISSION NO.** AE22134	**RWP:** CO-762 Rev~~6~~ SJHH-0080
SAMPLING SUMMARY	**SITE/EQUIPMENT INSPECTION:** (Yes) No	*HHU CASE#1 HHU CAT #2 HHUXL#3*

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1. N/A
2.
3.

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Pre-Trip Inspection.
0715	TRAVEL TO SMURF BLDG. ACE-IN
0810	PDD by R. FRANZEN (FWS)
0830	AT WORK SITE TO TAKE SAMPLE FROM SX SAMPLE
—	PORT AT TRAILER WHAT EVER WATER MAY BE IN LINE.
0842	COLLECT SAMPLE...PROCESS AND TAKE TO 2225 LABS.
0920	DROP OFF SAMPLES TO 2225 LABS.
—	SX SAMPLE TRAILER NOT OPERATING AT THIS TIME.
—	* SAMPLE SUMMARY *
—	- SAMPLE # BZRML1 ~ 750 mL SAMPLE COLLECTED
—	- SEE ATTACHED PAPER WORK FOR MORE INFORMATION
0950	TRAVEL TO ES OFFICE.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, ~~*Amos,*~~ *Ehrgott,* STEFFIER
NCO: SNOOK REVEREA
HPT: MILLER, RICHTER
FWS: Franzan,

WEATHER: Cloudy W/Rain 57 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-006-001	PAGE 1 OF 1
COLLECTOR: Rory Z Steffler	COMPANY CONTACT: TABOR, CL	TELEPHONE NO.: 373-3981	PROJECT COORDINATOR: SHRUM, A	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: Sample Outlet	PROJECT DESIGNATION: SX Porewater Extraction Test Project, Stage III (Porewater and QC Sample		SAF NO.: V13-006	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-007	FIELD LOGBOOK NO.: NA	ACTUAL SAMPLE DEPTH: NA	COA: NA	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	OFFSITE PROPERTY NO.: NA			BILL OF LADING/AIR BILL NO.: NA	

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 may or may 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

PRESERVATION				HNO3 to pH <2		Cool~6C	
HOLDING TIME				6 Months		28 Days/48 Hours	
TYPE OF CONTAINER				G/P		G/P	
NO. OF CONTAINER(S)				1		1	
VOLUME				500mL		500mL	
SAMPLE ANALYSIS				SEE ITEM (1) IN SPECIAL INSTRUCTIONS		IC Anions - 9056;	
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME				
B2RML1	WATER	11-11-13	0842	X		X	

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: RZSteffler R.Z. Steffler	DATE/TIME: 11-11-13 0917	RECEIVED BY/STORED IN: Sharon Holdren	DATE/TIME: 11/11/13 0917
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
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

Weekly sample
(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};

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

PRINTED ON 10/1/2013

A-6003-618 (REV 2)

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev DG 0

Date Samples Received: 11/11/2013 Group #: _____

Number of Samples: _____

Sample Custodian: Shawn L Walker

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSA/COC provided?	✓			
RSR provided?		✓		
Verify GKI is complete		✓		☑ In Project File
Received from an alpha facility?	✓			☐ Contact PC for approval to release
Check that outer custody seal is intact, if present	✓			
Record cooler temperature in centigrade, as appropriate	0.6			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
Verify that COC or RSA is accurate and complete, containing the following information:				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) are noted on the COC/RSA and sample bottle		✓		
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.

Samples acceptable for release? Yes PC/SC Initials SLW Date 11.11.13

If No, comment on communication and resolution:

Other Comments:

A-6005-302 (REV 3)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform Routines

DATE: 11-12-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 66

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.5 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Following Distance.
0710	TRAVEL TO SMURF Bldg. ACE-IN
0810	AT SX-TRAILER STAND by FOR PRE-JOB.
0840	PERFORM ROUTINES SX-EXTRACTION TRAILER (C8824)
0915	ROUTINES COMPLETED... NO ISSUES.
0920	LEAVING WORK SITE FOR ES OFFICE.
1000	COMPLETE PAPER WORK AT ES OFFICE.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Ehrgott, Weakley
NCO: Jill
HPT: MINEY, PATRICK, TONY
FWS: Franzan,

WEATHER: Cloudy W/Rain 57 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 | **DATE:** 11-13-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 67

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1 HHU CAT #2 HHUXL#3*

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic: Turns.
0715	TRAVEL TO SX-FARM TRAILER
0805	STAND-BY FOR PRE-JOB @ MO 563
~~0836~~ 0845	PERFORM DAILY ROUTINES
0900	ROUTINES COMPLETED. TRAVEL TO TX-RMA FOR INVENTORY
1015	COMPLETED INVENTORY AT TX RMA
1025	TRAVEL TO ES OFFICE, COMPLETE PAPER WORK.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Ehrgott, Weakley
NCO: SNOOK
HPT: LEMBSEY
FWS: Franzan,

WEATHER: Cloudy W/Rain 57 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 | **DATE:** 11-14-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1, U-DIG # 13140541 | **REPORT #** 68

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Backing Up.
0715	TRAVEL TO SMURF Bldg. ACE-IN.
0805	STAND BY FOR PRE-JOB HU
0830	PERFORM DAILY ~~REPORT~~ ROUTINES.
0850	COMPLETED DAILY ROUTINES... NO ISSUES.
-	TRAVEL TO ENW.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Amos, Ehrgott, Weakley
NCO: SHARP
HPT: PATRICK
FWS: Franzan,

WEATHER: Cloudy W/Rain 57 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 | **DATE:** 11-15-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction | **EXCAVATION:** DAN-13- 0036R1 U-DIG # 13140541 | **REPORT #** 69

START CARD NO. SE48334 | **DECOMMISSION NO.** AE22134 | **RWP:** CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No | *HHU CASE#1* *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Sharing the Road With…Pedestrians.
0710	TRAVEL TO SMURF Bldg. ACE-IN
0755	ARRIVE @ MO 563 FOR PRE-JOB STAND-BY…
0830	PER FORM DAILY ROUTINE C8824 & SX-EXTRACTIN TRAILER.
0855	COMPLETE DAILY ROUTINES… NO ISSUE'S NOTED.
0900	TRAVEL TO ENEW AND THEN TO ES OFFICE, SX TASK COMPLETED.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT ~~Amos~~, Ehrgott,
NCO: SNOOK
HPT: LENSEY
FWS: Franzan,

WEATHER: Cloudy /windy 57 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 and pull sample?

DATE: 11-18-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 70

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. ~~N/A~~ B2T087		
2. N/A SEE ATTACHED		
3. N/A PAPER WORK		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # _____ Tubing ( ) @ N/A to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Sharing the Road With…Cyclists and Motorcyclists.
0815	Arrived at SMURF building to ace in under CO-762.
0830	At SX Farm for pre job meeting. Went to water extraction site.
0842	Pulled water sample (B2T087) from SX sample port. Sample consisted of only about 100 ml of water. Phone calls were made and the sample was to be analyzed for Anions. Not enough water to split for radionuclides.
0910	Transported and relinquished sample to 222-S Lab.
1000	Returned to annex.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Steffler, Weakley, ~~Hoopes~~
NCO: Sharp, Snook
HPT: Lindsey
FWS: Franzan,

WEATHER: Cloudy /windy 52 degrees

DOWNTIME: None

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: RZ Steffler
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: RZ Steffler

REVIEWED BY: MIKE EHRGOTT
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: Mike Ehrgott **DATE:** 12-11-13

10/06/09 Rev 1

Washington River Protection Solutions

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

V13-006-005 | PAGE 1 OF 1

COLLECTOR Rory Z Steffler	**COMPANY CONTACT** TABOR, CL	**TELEPHONE NO.** 373-3981	**PROJECT COORDINATOR** SHRUM, A
SAMPLING LOCATION Sample Outlet	**PROJECT DESIGNATION** SX Porewater Extraction Test Project, Stage III (Porewater and QC Sample		**SAF NO.** V13-006
ICE CHEST NO. TFVS-09-007	**FIELD LOGBOOK NO.** N/A	**ACTUAL SAMPLE DEPTH** NA	**COA** NA
SHIPPED TO 222-S Lab Operations	**OFFSITE PROPERTY NO.** NA		**BILL OF LADING/AIR BILL NO.** NA

PRICE CODE C03 — **DATA TURNAROUND**

AIR QUALITY ☐ — 60 Days / 120 Days

METHOD OF SHIPMENT GOVERNMENT VEHICLE — ORIGINAL

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 may or may 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

PRESERVATION	HNO3 to pH <2	Cool~4C
HOLDING TIME	6 Months	28 Days/48 Hours
TYPE OF CONTAINER	G/P	G/P
NO. OF CONTAINER(S)	1	1
VOLUME	500mL	500mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS
SAMPLE NO.	**MATRIX***	**SAMPLE DATE**	**SAMPLE TIME**		
B2T087	WATER	11-18-13	0842		X

CHAIN OF POSSESSION — **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rory Z Steffler	11-15-13 0910	Sharon L Holder	11-15-13 0910

SPECIAL INSTRUCTIONS
(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};
(2) IC Anions - 9056 {2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate};

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

PRINTED ON 10/1/2013

A-6003-618 (REV 2)

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev DG-0

Date Samples Received: 11.18.2013 Group #: _____

Number of Samples: _____

Sample Custodian: _____

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSA/COC provided?	✓			
RSR provided?	✓			
Verify GKI is complete		✓		☐ In Project File
Received from an alpha facility?		✓		☐ Contact PC for approval to release
Check that outer custody seal is intact, if present	✓		SLH 11-18-13	
Record cooler temperature in centigrade, as appropriate	-1.6			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
Verify that COC or RSA is accurate and complete, containing the following information:				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) are noted on the COC/RSA and sample bottle	✓			Cool ~ -4 C
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.

Samples acceptable for release? Yes PC/SC Initials SLH Date 11.18.13

If No, comment on communication and resolution:

Other Comments:

A-6005-302 (REV 3)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 11-19-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 71

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Sharing the Road With…Old Drivers.
0720	TRAVEL TO SMURF Bldg. TO ACE-IN
0800	ARRIVE AT MO 563 FOR PRE-JOB.
0820	START ROUTINES
0835	ROUTINES COMPLETED... NO ISSUE'S
0840	LEAVING SX-FARM FOR ES OFFICE.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Ehrgott, Weakley, Gardner
NCO: SWOOK, SHARP
HPT: KERNSEY
FWS: Franzan,

WEATHER: Cloudy /windy 52 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 11-20-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 72

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1. N/A		
2. N/A		
3. N/A		
4. N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Sharing the Road With…Slow-Moving Vehicles.
0720	TRAVEL TO SMURF Bldg. ACE-IN.
0830	PRE-JOB AT M.O. 523
0850	ROUTINES COMPLETED NO ISSUE'S NOTED.
0900	TRAVEL TO ES OFFICE
—	NOTE; NCO'S PLACED MORE INSULATION AROUND
—	C8824 AND PLACED ~~AROUND~~ PLASTIC OVER INSULATION.
—	TEMP. IS SUPPOSE TO DROP.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Ehrgott, Weakley,
NCO: SNOOK
HPT: LEWIS
FWS: Franzan,

WEATHER: Cloudy /windy 52 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 11-21-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 73

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # — Tubing ( ) @ to ft bgs; S.U.

Borehole # — Tubing ( ) @ to ft bgs; S.U.

Borehole # — Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Sharing the Road With…Buses and Emergency Vehicles.
0700	Head to 200 WEST to do routines on SX Farm EXT
0810	Doing Routines
0940	Head to ENW with Rams (Hyd.) for XL
1100	Head to office
1200	Lunch
1230	Paper work.
1530	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Ehrgott, Weakley,
NCO: Scott
HPT: Pat
FWS: Franzan,

WEATHER: Cloudy /windy 52 degrees

DOWNTIME: 0

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: ~~Mike Ehrgott~~ AMES

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: L. O. Amos

REVIEWED BY: MIKE EHRGOTT

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: Mike Ehrgott **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 11-25-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 74

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

Borehole # N/A Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Are You Driving Yourself Crazy?
0720	TRAVEL TO SWCRF B/dg. TO ACE-IN
0810	PRE-JOB
0830	PER-FORM ROUTINE CHECKS NO ISSUES NOTED.
0900	LEAVING SX WORK AREA FOR ENW.
1000	COMPLETE PAPER WORK

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Ehrgott, Weakley,
NCO: LOMBSEY
HPT: SNOOK, SHARP
FWS: Franzan,

WEATHER: Cloudy 30 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 11-26-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 75

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic; Are You Driving Yourself Crazy?
0930	TRAVEL TO SX M.O. 563 FOR PRE-JOB
1015	PRE-JOB BY R. FRANZEN (FWS)
1040	PERFORM DAILY ROUTINES... NO ISSUES NOTED.
1100	COMPLETED ROUTINES... STAND BY AT M.O. 563 FOR
—	TEST DIRECTOR... ES CREW TO SUPPORT NITROGEN TANK
—	ADDITION AT EXTRACTION TRAILER. LUNCH.
1230	PRE-JOB WITH WRPS TEST DIRECTOR, PROJECT MANAGER
—	AND CEES, PM, PE.
1245	CHANGE ADD TWO SMALL NITROGEN TANKS AND SEPERATE MANIFOLD
	TO ISOLATE C8825 AND C8826, ALSO CHECK FOR WATER.
1330	COMPLETED WORK TASK.
1345	TRAVEL TO ES. COMPLETE PAPER WORK
1530	END OF SHIFT.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Ehrgott, Weakley,
NCO: SHARP, SWOOK
HPT: LEWDSEY
FWS: Franzan,

WEATHER: Cloudy 38 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA ROGERS
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 11-27-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 76

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Older Drivers Have Special Needs?
0720	TRAVEL TO SMURF bldg. ACE-IN
0830	PRE-JOB AT M.O. 563
—	PER FORM DAILY ROUTINES AT EXTRACTION TRAILER FOR EXTRACTION
—	WELL C8824. NOTIFIED TEST DIRECTOR THAT GAUGES FOR
—	C8825 & C8826 WERE READING 15+ PSI... MADE ADJUSTMENT
—	TO REGULATOR SET PRESSURE TO ~10.5 PSI... ALSO NITROGEN
—	TANK PRESSURE HAD DROPPED TO 650 PSI FROM 2000 PSI..
—	OVERNIGHT.
0910	DAILY ROUTINES COMPLETED
0915	LEAVING SX FARM FOR ENW.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Ehrgott, Weakley,
NCO: N/A
HPT: LEWSEY, PAT
FWS: Franzan,

WEATHER: Cloudy 38 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE.

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] **DATE:** 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824, Sampling.

DATE: 12-2-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 77

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A	BZT088	
2.N/A	- SEE ATTACHED	
3.N/A	PAPER WORK. ME 12-10-13	
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a____Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a____Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Safety Checklist For Automobiles.
0750	Aced in at SIMURF for SX Tank Farm.
0812	On location for SX pre job. Data logger is not operational.
0826	At extraction site for daily inspection and sampling.
0833	Sampled SX porewater from valve V106. There was only approximately 200 ml water available for samples. Per Cindy Tabor, the available water was to be used for the IC Anions sample. CoC # V13-006-006.
0900	Arrived @ 222-S lab.
0916	Relinquished sample to the lab.
1000	Returned to annex.

12-2-13 RZS

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Steffler, Weakley,
NCO: —
HPT: Lindsey
FWS: Franzan

WEATHER: Cloudy 40 degrees Windy

DOWNTIME: None

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott / RZ Steffler
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: R.Z. Steffler

REVIEWED BY: MIKE EHRGOTT
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: Mike Ehrgott **DATE:** 12-10-13

10/06/09 Rev 1

Washington River Protection Solutions

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

V13-006-006 | PAGE 1 OF 1

COLLECTOR Rory Z Steffler	**COMPANY CONTACT** TABOR, CL	**TELEPHONE NO.** 373-3981	**PROJECT COORDINATOR** SHRUM, A
SAMPLING LOCATION Sample Outlet V106	**PROJECT DESIGNATION** SX Porewater Extraction Test Project, Stage III (Porewater and QC Sample		**SAF NO.** V13-006
ICE CHEST NO. TFVS-09-007	**FIELD LOGBOOK NO.** NA	**ACTUAL SAMPLE DEPTH** NA	**COA** NA
SHIPPED TO 222-S Lab Operations	**OFFSITE PROPERTY NO.** NA		**BILL OF LADING/AIR BILL NO.** NA

PRICE CODE C03 — **DATA TURNAROUND**

AIR QUALITY ☐ — 60 Days / 120 Days

METHOD OF SHIPMENT GOVERNMENT VEHICLE — ORIGINAL

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 may or may 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

			PRESERVATION	HNO3 to pH <2	Cool~4C
			HOLDING TIME	6 Months	28 Days/48 Hours
			TYPE OF CONTAINER	G/P	G/P
			NO. OF CONTAINER(S)	1	1
			VOLUME	500mL	500mL
			SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS
SAMPLE NO.	**MATRIX***	**SAMPLE DATE**	**SAMPLE TIME**		
B2T088	WATER	12-2-13	0833		X

~1.2°

CHAIN OF POSSESSION — **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM — DATE/TIME	RECEIVED BY/STORED IN — DATE/TIME
RZ Steffler 12-2-13 0916	Sharon L Holder 12-2-13 0916
~~Sharon L Holder 12-2-13 0916~~	

SPECIAL INSTRUCTIONS
(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};
(2) IC Anions - 9056 {2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate};

LABORATORY SECTION — RECEIVED BY — TITLE — DATE/TIME

FINAL SAMPLE DISPOSITION — DISPOSAL METHOD — DISPOSED BY — DATE/TIME

PRINTED ON 10/1/2013

A-6003-618 (REV 2)

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev 06 0

Date Samples Received: 12-2-13 Group #: _____

Number of Samples: _____

Sample Custodian: Shu L Mahler

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSA/COC provided?	✓			
RSR provided?	✓			
Verify GKI is complete		✓		☐ In Project File
Received from an alpha facility?		✓		☐ Contact PC for approval to release
Check that outer custody seal is intact, if present				
Record cooler temperature in centigrade, as appropriate	1.2			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
Verify that COC or RSA is accurate and complete, containing the following information:				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) are noted on the COC/RSA and sample bottle	✓			
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.

Samples acceptable for release? yes PC/SC Initials SHL Date 12-2-

If No, comment on communication and resolution:

Other Comments:

A-6005-302 (REV 3)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-3-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 78

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Winterizing You Car..
0700	Head to 200-west SX farm
0800	Prejob at SX for Routines at pond-extraction site
0813	Pre form routines
0845	No leaks visible, All equipment operating as usuall.
	Head to yard
1100	lunch
1130	pre form equipment checks and repairs
1530	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT Steffler, Weakley,
NCO: Jill
HPT: PaT
FWS: Franzan,

WEATHER: Cloudy 35 degrees
Snow Windy

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott - Amos, Zle O. Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Zle O. Amos

REVIEWED BY: MIKE EHRGOTT
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: Mike Ehrgott **DATE:** 12-10-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-4-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 79

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; What Every Motorist Should Carry.
0700	Head to Smerk Bld. to Acc in.
0800	AT SX - Held pre-job to preform routines at pore extraction Site
0815	AT extraction trailer preform routines, inspect motor lines, Generators, and equipment inside trailer.
0940	All appears to be operating as normal
	Head to shop to work on equipment.
1100	lunch
1130	AT shop
1530	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Amos
NCO: Swook
HPT: Lensday
FWS: Franzan,

WEATHER: Partly Cloudy 28 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: ~~Mike Ehrgott~~ KA Olin Amos

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: Olin Amos

REVIEWED BY: MIKE EHRGOTT

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: Mike Ehrgott DATE: 12-10-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 and attempt sample.

DATE: 12-5-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 80

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s Interval %

1. N/A
2. N/A
3. N/A
4. N/A

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring # Interval Type

1. N/A
2.
3.

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Towing Tips.
0700	Head to station to get gas. Then head to 200-west SX Trailer for prejob an SX pore extraction Routines
0830	Prejob for Routines
049	Do routines at pore extraction site, All appears To be functioning properday.
0930	AT SX Trailer waiting for prejob for TX, 4 more holes.
1000	Prejob - Harold, Cindy, Will, Ehgott, Penny, Olin, Weakley, Snocks, Sharp, Pat were present. Discussed 4 more sites to push at TX-Farm! no walk Through
1040	Head to ENW.
1105	Lunch
1135	AT ENW, start equipment and let warm up. checkout
1530	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Amos, Steffler
NCO: Sharp, Snock
HPT: Pat
FWS: Franzan,

WEATHER: Partly Cloudy 26 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: ~~Mike Ehrgott~~ Amos

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: Olin Amos

REVIEWED BY: MIKE EHRGOTT

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: Mike Ehrgott DATE: 12-10-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 and attempt sample, and support modifications to extraction trailer.

DATE: 12-9-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 81

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Protecting Your Car From Theft.
0720	TRAVEL TO SX FARM FOR PRE-JOB
0810	ARRIVE AT SX MW. 563 FOR PRE-JOB.
0830	ARRIVE AT SX EXTRACTION TRAILER, RAMP DOWN VAC PUMP
—	RUN BLADDER PUMP MANUALLY FOR ~ 40 MIN PER TEST
—	DIRECTOR. COLLECT ~ 14 ML OF WATER SAMPLE
0930	SHUT DOWN BLADDER PUMP... VAC PUMP HAS BEEN RAMP
—	DOWN BUT IS RUNNING. ~ 15 ML WATER SAMPLE COLLECTED.
—	WAITING FOR NEW ECN # TO BE ADDED TO WORK
—	PACKAGE TO BE ABLE TO PERFORM MODIFICATIONS.
1000	LEAVING SX WORK SITE FOR ES OFFICE...
—	HELP R. STEFFLER CHANGE FLAT TIRE ON FORD EXPLORER.
1150	ARRIVE AT ES OFFICE, COMPLETE PAPER WORK
1130	LUNCH
1530	END OF SHIFT.
—	NOTE: SEE ATTACHED PAPER WORK FOR SAMPLE INFO.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Amos, Steffler, Ehrgott
NCO: SNOOK
HPT: LENOSKY
FWS: Franzan,

WEATHER: Partly Cloudy 24 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: [signature] DATE: 12-11-13

10/06/09 Rev 1

Washington River Protection Solutions — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — **V13-006-007** — **PAGE 1 OF 1**

COLLECTOR	**COMPANY CONTACT** TABOR, CL.	**TELEPHONE NO.** 373-3981	**PROJECT COORDINATOR** SHRUM, A	**PRICE CODE** C03	**DATA TURNAROUND**
SAMPLING LOCATION Sample Outlet	**PROJECT DESIGNATION** SX Porewater Extraction Test Project, Stage III (Porewater and QC Sample		**SAF NO.** V13-006	**AIR QUALITY** ☐	**60 Days / 120 Days**
ICE CHEST NO. TFUS - 09-007	**FIELD LOGBOOK NO.**	**ACTUAL SAMPLE DEPTH**	**COA**	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	**ORIGINAL**
SHIPPED TO 222-S Lab Operations	**OFFSITE PROPERTY NO.**		**BILL OF LADING/AIR BILL NO.**		

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 may or may not be regulated for transportation per 49 CFR/IATA Dangerous Goods Regulations but are not releasable per DOE Order 458.1.

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	SPECIAL ANALYSIS	PRESERVATION	HOLDING TIME	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME
B2T089	WATER	12-6-13	0940		HNO3 to pH <2	6 Months	G/P	1	500mL
					Cool-4C	28 Days/48 Hours	G/P	1	500mL
				SPECIAL HANDLING AND/OR STORAGE				SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS

CHAIN OF POSSESSION — **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	**DATE/TIME** 12-6-13 1600	**RECEIVED BY/STORED IN**	**DATE/TIME**
RELINQUISHED BY/REMOVED FROM	**DATE/TIME** 12-6-13 1600	**RECEIVED BY/STORED IN** Sharon L Hall	**DATE/TIME** 12-6-13 1600
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**
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
(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};
(2) IC Anions - 9056 {2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate};

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

PRINTED ON 10/1/2013

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev 06

Date Samples Received: 12-9-17 Group #: _____

Number of Samples: 1

Sample Custodian: Shawn L Wade

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSA/COC provided?	✓			
RSR provided?	✓			
Verify GKI is complete		✓		☐ In Project File
Received from an alpha facility?		✓		☐ Contact PC for approval to release
Check that outer custody seal is intact, if present	✓			
Record cooler temperature in centigrade, as appropriate	02			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
Verify that COC or RSA is accurate and complete, containing the following information:				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) are noted on the COC/RSA and sample bottle	✓			
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.

Samples acceptable for release? Yes PC/SC Initials SLW Date 12-9-2017

If No, comment on communication and resolution:

Other Comments:

A-6005-302 (REV 3)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824, and support modifications to extraction trailer.

DATE: 12-10-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 82

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; If Your Involved in a Collision.
0720	TRAVEL TO SX MO 563 FOR PRE-JOB
0810	PRE-JOB BY R. FRANZEN STANDBY FOR TEST DIRECTOR.
1100	LUNCH
1130	PRE-JOB BY R. FRANZEN WRPS, PM, TEST DIRECTOR, CEES
1145	ARRIVE AT SX EXTRACTION TRAILER
—	RE-PLUMB ¼" TUBING TO VACCUM PUMP #2 PER TEST
—	DIRECTOR & CEES COLUMBIA ENVIR, ENERGY SERVICES.
—	REMOVE Fig BOLTS AND Fig FROM C8824 BACK PULL
—	TRANSDUCER AND BLADDER PUMP FROM SUMP TO G.S.
—	VERIFY OPERATION OF TRANSDUCER, REMOVE BLADDER PUMP
—	FROM LINES IN INSTALL NEW, REBUILT BLADDER PUMP
—	FROM COLUMBIA ENVIR ENERGY SERVICES AND RE-INSTALL IN
—	C8824, RE SEAL FLANGE WITH SILICON WILL LET CURE
—	TILL 12 NOON TOMORROW PER TEST DIRECTOR,
1300	LEAVING SITE FOR ES OFFICE. COMPLETE PAPER WORK
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Amos, Ehrgott
NCO: SNOOK
HPT: LOWERY
FWS: Franzan,

WEATHER: Partly Cloudy 24 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE:

REVIEWED BY: AQUILA HOOPES
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: DATE: 12-11-13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824, and support start up.

DATE: 12-11-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 83

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev. 6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; If You Witness a Collision.
1030	TRAVEL TO SMURF TO ACE-IN.
1130	AT SX-FARM MO 563. FOR PRE-JOB
—	LUNCH
1210	PRE-JOB - MODIFICATIONS AT EXTRACTION TRAILER
1230	AT WORK SITE EXTRACTION TRAILER, NO NEED TO PERFORM
—	ROUTINES PER TEST DIRECTOR BECAUSE OF STARTING SYSTEM
—	BACK UP FROM PREVIOUS DAYS WORK.
—	HOOKED UP SECOND TANK OF NITROGEN SET PSI TO 11PSI ON C8825 & C8826 PACKERS PER TEST DIRECTOR.
1330	LEAVING SX-SITE FOR ENW YARD.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Amos, Ehrgott
NCO: SMOOK
HPT: LINDSEY
FWS: Franzan,

WEATHER: Partly Cloudy 34 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E. Skoglie **DATE:** 12/19/13

10/06/09 Rev 1

ENERGY SOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824, and support start up.

DATE: 12-12-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 84

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; If You Have A Blowout.
0720	TRAVEL TO SX-FARM MO5203
0810	PRE-JOB by R. FRANZEN FWS.
0830	PERFORM ROUTINES... NOTIFIED TEST DIRECTOR THAT
—	BLADDER PUMP TURNED OFF, SHE WAS A WEAR.
—	NO OTHER ISSUSE NOTED
0900	LEAVING SX WORK SITE FOR ES OFFICE FINISH PAPER
—	WORK
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Amos, Ehrgott
NCO:
HPT:
FWS: Franzan,

WEATHER: Partly Cloudy 24 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D. E. S Roglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Shoglie **DATE:** 12/19/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-13-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 85

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; If You Have A Breakdown
0700	Head to SX for routines
0800	Do routines, Adjusted packers, System still down
0930	Head to office (Well is stable)
0930	Paper work

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Amos
NCO:
HPT:
FWS: Franzan,

WEATHER: Partly Cloudy 24 degrees

DOWNTIME: N/A

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: ~~Mike Ehrgott~~ Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 12/19/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-16-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 86

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #___n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic; Southbound Smashup.
0730	TRAVEL TO SMURF ACE-IN.
0815	PRE-JOB AT MO 563.
0830	PERFORM DAILY ROUTINES. NO ISSUES.
—	NOTIFIED TEST DIRECTOR THAT NITROGEN TANKS EMPTY... SHE
—	SAID THEY WRPS, CEES ARE LOOKING AT 14 PATH FORWARD.
0910	ROUTINES COMPLETED LEAVING SITE FOR ENW.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT , Weakley, Ehrgott
NCO: N/A
HPT: LINDSEY
FWS: Franzan,

WEATHER: Partly Cloudy 24 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 12/19/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-17-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 87

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample # 's	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic; Southbound Smashup.
0730	TRAVEL TO SX MO 563 FOR PRE-JOB
0810	PRE-JOB by R. FRANZEN FWS
0830	PERFORM DAILY ROUTINES.
0900	ROUTINES COMPLETED ... LEAVING SITE FOR ENW.
—	NOTE: TEST DIRECTOR HAS BEEN COMING OUT IN AFTERNOONS
—	AND OPERATING BLADDER PUMP

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Ehrgott
NCO:
HPT:
FWS: Franzan,

WEATHER: Partly Cloudy 24 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D. E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 12/19/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824, attempt water sample.

DATE: 12-18-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 88

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A	SEE ATTACHED	
2.N/A	FOR SAMPLE	
3.N/A	INFO	
4.N/A		

SITE/EQUIPMENT INSPECTION: *Yes* *No*

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole # n/a *Tubing ( ) @ to ft bgs; S.U.*

Borehole # n/a *Tubing ( ) @ to ft bgs; S.U.*

Borehole # n/a *Tubing ( ) @ to ft bgs; S.U.*

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Attitude Is Everything.
0715	TRAVEL TO SMURF TO ACE-IAL
0830	PRE-JOB AT SX-FARM MO 5203.
0840	PERFORM ROUTINES, TEST DIRECTOR & CEES ON SITE
—	CYCLE BLADDER PUMP FOR TEST DIRECTOR.
0850	TAKE WATER SAMPLE ~ 650ML WAS COLLECTED
0920	LEAVING WORK LOCATION FOR 222S LABS... DROP OFF SAMPLE.
0952	LEAVING FOR TX-FARM, THEN A-FARM PICK UP GREAT PUMP/TRAILER
—	AND DELIVER TO EMW.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Ehrgott
NCO: SHARP
HPT: LINDSEY
FWS: Franzan,

WEATHER: Partly Cloudy 24 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D.E. Shoaliii
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Shoaliii **DATE:** 12/19/13

10/06/09 Rev 1

Washington River Protection Solutions — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — **V13-006-008** — **PAGE 1 OF 1**

COLLECTOR Ray Z Steffler	**COMPANY CONTACT** TABOR, CL	**TELEPHONE NO.** 373-3981	**PROJECT COORDINATOR** SHRUM, A	**PRICE CODE** **C03** **DATA TURNAROUND**
SAMPLING LOCATION Sample Outlet	**PROJECT DESIGNATION** SX Porewater Extraction Test Project, Stage III (Porewater and QC Sample		**SAF NO.** V13-006	**AIR QUALITY** ☐ **60 Days / 120 Days**
ICE CHEST NO. TFVS-09-007	**FIELD LOGBOOK NO.** N/A	**ACTUAL SAMPLE DEPTH** N/A	**COA** N/A	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE **ORIGINAL**
SHIPPED TO 222-S Lab Operations	**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 may or may 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

SAMPLE NO.	MATRIX*	PRESERVATION	HOLDING TIME	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	SAMPLE ANALYSIS	SAMPLE DATE	SAMPLE TIME	
		HNO3 to pH <2	6 Months	G/P	1	500mL	SEE ITEM (1) IN SPECIAL INSTRUCTIONS			
B2T090	WATER	Cool~4C	28 Days/48 Hours	G/P	1	500mL	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	12-18-12	0952	X
										X

CHAIN OF POSSESSION — **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM Ray Z Steffler	**DATE/TIME** 12-18-12 0930	**RECEIVED BY/STORED IN** Shawn Helton	**DATE/TIME** 12-18-12 0930
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**
RELINQUISHED BY/REMOVED FROM	**DATE/TIME**	**RECEIVED BY/STORED IN**	**DATE/TIME**

SPECIAL INSTRUCTIONS
(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};
(2) IC Anions - 9056 {2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate};
Approx 650 mL Total sample volume.

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

PRINTED ON 10/1/2013

A-6003-618 (REV 2)

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev 000

Date Samples Received: 12-18-2013 Group #: _____

Number of Samples: 2

Sample Custodian: Shawn L Hallett

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSA/COC provided?	✓			
RSR provided?	✓			
Verify GKI is complete		✓		☐ In Project File
Received from an alpha facility?		✓		☐ Contact PC for approval to release
Check that outer custody seal is intact, if present	✓			
Record cooler temperature in centigrade, as appropriate	0.8			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
Verify that COC or RSA is accurate and complete, containing the following information:				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) are noted on the COC/RSA and sample bottle	✓			
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.

Samples acceptable for release? Yes PC/SC Initials SLH Date 12-18-2013

If No, comment on communication and resolution:

Other Comments:

A-6005-302 (REV 3)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-19-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 89

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic; What Is Ergonomics…And Why Is It Important?
0730	TRAVEL TO SX-FARM M0563 FOR PRE-JOB
0820	PRE-JOB
0830	PERFORM DAILY ROUTINES... NO ISSUES
0900	COMPLETED ROUTINES TRAVEL TO 222-S AND PICKUP NEW
—	SAMPLE BOTTLES.
0945	ARRIVE BACK AT ES OFFICE.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Ehrgott
NCO: SHARP
HPT: LINDSEY
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D. E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 12/19/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-23-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 90

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes / No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a__ Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a__ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a__ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Accidents Cost Everyone.
0730	TRAVEL TO SMURF Bldg. ACE-IN.
0815	PRE-JOB AT MO 563.
0830	PERFORM DAILY ROUTINES AT EXTRACTION TRAILER.
0910	TRAVEL NO ISSUES NOTED.. LEAVING SITE FOR ENW
—	TASK COMPLETED.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Ehrgott
NCO: SNOOK
HPT: LINDSEY
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D.E. Skoglund
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E. Skoglund **DATE:** 12/31/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-26-13 ~~12-26-13~~ 12-27-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 91

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; On-The-Job Injuries…Fact or Fiction
0725	TRAVEL TO SMURF... ACE-IN.
0810	PRE-JOB AT MO 563.
0830	PERFORM DAILY ROUTINE. NO ISSUE'S NOTED.
0915	TRAVEL TO ES OFFICE... TASK COMPLETE.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Ehrgott
NCO: SWOOK
HPT: LINDSEY
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE:

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 12/31/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 12-27-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 92

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic; The Leading Causes of On The Job Injuries.
0730	TRAVEL TO SX TRAILER MO 563
0810	PRE-JOB BY R. FRANZEN (FWS)
0830	PERFORM DAILY ROUTINES NO ISSUES NOTED,
2850	LEAVING SX FOR ES OFFICE ... TASK COMPLETED.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Ehrgott
NCO: SHOOK
HPT: LINDSEY
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D.E. SKoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E. Skoglie **DATE:** 12/31/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824, Sampling.

DATE: 12-30-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 93

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

Borehole # n/a Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

WORK SUMMARY

TIME	
0600	Safety meeting at ES office, Topic; Do The Right Thing.
0700	Head to 200-west to do routines at SX extraction Trailer.
0725	At Acess station, Ace in and go to SX
0800	waiting for RCT
0820	Do routines, all looks good, no samples (water) today.
0916	Head to office
0930	Head to EMW to move rig to new site and set up
1100	lunch
1130	clean up area finish moving equipment
1530	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Steffler
NCO: Scott
HPT: mincey
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: 0

DISCARDED ITEMS: -0-

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: ~~Mike Ehrgott~~ Olin Amos

TITLE : *ES TECHNICAL PREPARER*

SIGNATURE: Olin Amos

REVIEWED BY: D.E. Skoglie

TITLE: *ES TECHNICAL REVIEWER*

SIGNATURE: David E Skoglie **DATE:** 12/31/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824, Sampling.

DATE: 12-31-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 94

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Horseplay Is No Joke.
0720	TRAVEL TO SMURF TO ACE-1W
0800	PRE-JOB AT MD 523 by FWS.
0820	PERFORM DAILY ROUTINES, NO ISSUES NOTED
0900	TRAVEL TO ES OFFICE
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT , Weakley, Ehrgott
NCO:
HPT:
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: None

DISCARDED ITEMS: None

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Mike_Ehrgott

TITLE : ES TECHNICAL PREPARER

SIGNATURE: Mike Ehrgott

REVIEWED BY: D. E. Shoglio

TITLE: ES TECHNICAL REVIEWER

SIGNATURE: David E Shoglio **DATE:** 12/31/13

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-02-13

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 95

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Fire Extinguishers.
0710	Head to Smerf Bld. to Ace in
0735	waiting on RCT to Ace
0800	Aced in head to SX
0815	POD, Go do routines at Extraction trailer.
0845	Pumps are off, no activities
0915	Head to Env
1100	lunch
1130	Paper work
1530	End shift

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Steffler
NCO: Sharp, Dill, Snook
HPT: Micy, Lisa
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: 0

DISCARDED ITEMS:

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E. Skoglie **DATE:** 1/10/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-06-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 96

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Ladder Safety.
0700	Head to 200 East Area, Aces station,
0735	waiting for personell at Aces station.
0810	All in head to 200-west SX.
0820	POD for routines
0840	Pre-form routines
0910	All looks good, Head to yard at ENW. clean drilling #4,
1100	lunch
1130	work on grout pump. (Get running and clean up)
1530	End shift
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley, Steffler
NCO: Snook, Izzy
HPT:
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Ames
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Ames

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/10/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-07-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 97

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Safety Matters-Even in an office.
0700	Head to SX - 200 west To do routines
0815	RCT's on site, preform routines.
0845	Looks good, no leaks.
0915	Head to EKW, work on grout pump
1100	lunch
1130	work on equipment
1530	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley
NCO: Snack, Jill, Sharp
HPT: —
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/10/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-08-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 98

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a____Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a____Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Chemical Spills & Leaks.
0700	Head to ~~Area~~ ENW To meet truck to haul Rig #4 to TX Farm.
0800	Truck on site load rig
0838	Head to TX Farm in 200-west
0910	Truck at TX unload rig.
0930	Rig spotted at TX, Head to SX to do routines
0938	POD, Head to extraction trailer and perform routines.
1019	routines complete. Head to ENW.
11:00	lunch
1130	Required reading and paper work
1530	End shift

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley
NCO: Snook
HPT: Ceasar
FWS: Franzan,

WEATHER: Partly Cloudy 35 degrees

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: D. E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/10/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-09-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 99

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Keeping the Lid on Flammable Liquids.
1230	Aced in at Smart building under CO-762.
1248	On location at SX for pre job brief. Dan Parker + Melissa Holme present. Doug Hildebrandt (DOE) to show for observation.
1320	DOE on location. Franzan conducted pre job. 125 ml non preserved sample is primary, preserved - rad sample secondary.
1332	At SX pore water sample trailer.
1340	Obtained sample from valve port V106. Approximately 90 ml of sample obtained. Only the Anions sample bottle was filled. See CoC# V13-006-009. Sample # B2F091
1410	Relinquished sample to 222-S lab.
1420	Return to Annex.
1500	Arrived at annex. Completed paperwork and forwarded to client.

RZS
1-9-14

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley Steffler
NCO: Skoog, Sharp.
HPT: Nunez
FWS: Franzan,

WEATHER: Partly Cloudy 41 degrees

DOWNTIME: NA

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Rz Steffler
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: R.Z. Steffler

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/16/14

10/06/09 Rev 1

Washington River Protection Solutions — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — V13-006-009 — PAGE 1 OF 1

COLLECTOR Rory Z Steffler	**COMPANY CONTACT** TABOR, CL	**TELEPHONE NO.** 373-3981	**PROJECT COORDINATOR** SHRUM, A
SAMPLING LOCATION Sample Outlet	**PROJECT DESIGNATION** SX Porewater Extraction Test Project, Stage III (Porewater and QC Sample		**SAF NO.** V13-006
ICE CHEST NO. TFV3-14-007	**FIELD LOGBOOK NO.** NA	**ACTUAL SAMPLE DEPTH** NA	**COA** NA
SHIPPED TO 222-S Lab Operations	**OFFSITE PROPERTY NO.** NA		**BILL OF LADING/AIR BILL NO.** NA

PRICE CODE C03 — **DATA TURNAROUND** — **AIR QUALITY** ☐ — 60 Days / 120 Days — **METHOD OF SHIPMENT** GOVERNMENT VEHICLE — ORIGINAL

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 may or may 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

	HNO3 to pH <2	Cool~4C
PRESERVATION		
HOLDING TIME	6 Months	28 Days/48 Hours
TYPE OF CONTAINER	G/P	G/P
NO. OF CONTAINER(S)	1	1
VOLUME	500mL	500mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B2T091	WATER	1-9-14	1340		X

Temp blank ~0 °C

CHAIN OF POSSESSION — **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rory Z Steffler	1-9-14 1410	RISteele RISteele AFL	1-9-14 1410

SPECIAL INSTRUCTIONS
(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238};
(2) IC Anions - 9056 {2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate};

Sample consists of only ≈ 90 ml of sample.

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

PRINTED ON 10/1/2013

A-6003-618 (REV 2)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-10-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 100

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; What To Wear.
0730	TRAVEL TO 200W OCC HEALTH CLINIC FOLLOW UP.
0900	TRAVEL TO SX - MO 563 PRE-JOB
—	PERFORM DAILY ROUTINE CHECKS ,,, NO ISSUES.
0945	TRAVEL TO E3 OFFICE COMPLETE PAPER WORK.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley Ehrgott
NCO: IZZY, Jill
HPT: Jim Mivey
FWS: Franzan,

WEATHER: Partly Cloudy 41 degrees
Very Windy

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D. E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/10/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-13-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 101

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; What To Wear. DEADly DOZEN by K. HUTCHINGS
0745	TRAVEL TO SMURF TO ACE-IN
0830	PRE-JOB AT SX TRAILER MO 563
0845	PERFORM ROUTINES AT EXTRACTION TRAILER NO ISSUE'S
—	NOTED. TASK COMPLETED.
0910	TRAVEL TO ES OFFICE.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley Ehrgott
NCO: SNOOK
HPT: CERVER
FWS: Franzan,

WEATHER: Partly Cloudy 41 degrees
Very Windy

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D. E. SKoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/20/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-14-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 102

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; What To Wear.
0730	Head to SX to do routines at extraction trailer
0800	POP at SX trailer
0815	Head down to extraction trailer to do routine inspection
0845	Inspection is done, All looks well. Head to ENW
0915	AT ENW move KL to shop to change out adapter sub
1100	lunch
1130	round up fuel for logging. deliver patches
1530	End shift.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Weakley Amos
NCO: Jill
HPT: Ceaser
FWS: Franzan,

WEATHER: Partly Cloudy 41 degrees
Very Windy

DOWNTIME: 0

DISCARDED ITEMS: 0

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Amos
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Amos

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/20/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-15-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 103

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ _Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Respiratory Protection
0930	PRE-JOB
0950	PERFORM ROUTINES AT EXTRACTION TRAILER.
1005	ROUTINES COMPLETED, NO ISSUES.
—	TRAVEL TO TX-FARM.

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT , Ehrgott, Amos
NCO:
HPT:
FWS: Franzan,

WEATHER: Partly Cloudy 50 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: D. E. SKoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/20/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824.

DATE: 01-16-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 104

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ __Tubing ( ) @ to ft bgs; S.U.

Borehole # __n/a_____ _Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
~~0700~~ 0700	Safety meeting at ES office, Topic; Brace Yourself...Back Support Belts.
0715	Head to Aces station to ACE into TX and SX
0740	AT Aces, ACE IN
0755	AT SX, waiting for RCT's for POD
0830	RCT's on site at SX Trailer POD
0841	AT extraction trailer to due routines
0906	Routines complete, All Looks good. Head to TX

N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Ehrgott, Weakley
NCO:
HPT:
FWS: Franzan,

WEATHER: Partly Cloudy 50 degrees

DOWNTIME: N/A

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: Olin Ames
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Olin Ames

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/20/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 attempt a sample.

DATE: 01-20-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 105

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0600	Safety meeting at ES office, Topic; Brace Yourself…Listen Up! *What you can do to protect your hearing.*
0750	Aced in under C0762 at the smurf building.
0810	Arrived at SX Farm.
0835	SX pre job. Stop work has been lifted.
0850	Performed daily check.
0905	Attempted to take sample. Not enough water for sample. Approximately 2 or 3 drops.
1000	Returned to annex.

RZS
1-20-14

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Seffler
NCO: Ruban
HPT: Cenzer
FWS: Franzan,

WEATHER: Partly Cloudy 50 degrees

DOWNTIME: NA

DISCARDED ITEMS: None

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: RZ Stoffler
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: R.Z. Stoffler

REVIEWED BY: D.E. Skoglie
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: David E Skoglie **DATE:** 1/20/14

10/06/09 Rev 1

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Perform daily Routines at extraction trailer and C8824 attempt a sample.

DATE: 01-23-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 104

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
~~1.N/A~~ B2T092		
2.N/A	SAMPLE INFO	
3.N/A	ATTACHED.	
4.N/A		

SITE/EQUIPMENT INSPECTION: (Yes) No

HHU CASE#1 *HHU CAT #2* *HHUXL#3*

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic; Box Cutter Safety.
0715	TRAVEL TO SUMMIT TO HOE-IN.
0800	PRE-JOB by FWS R. FRANZEN. 3 HR DOWN EXTRACTION PROCESS TRAILER
—	DE-MOB BLADDER PUMP, TRANSDUCER, TUBING... DRAIN
—	TUBING BACK INTO METER SUMP DRAIN.
—	TAG TAPED WATER IN SUMP AT 134.82' TOP OF FLANGE.
0945	TAKE WATER SAMPLE AT METER DRAIN BRT ~ 200mL.
—	SAMPLE # B2T092
1100	TRANSPORTED AND RELINQUISHED SAMPLE TO 222-S LABS.
1115	TRAVEL TO TX-FARM TO SUPPORT LOGGING WORK.

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Hoopes, Weakley, Ehrgott
NCO: Reveara, villareal
HPT: CERSEK
FWS: Franzan,

WEATHER: Over Cast 35 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE EHRGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: Penny Berlin
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: P C Berlin **DATE:** 1/23/14

10/06/09 Rev 1

Washington River Protection Solutions	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			V13-006-010	PAGE 1 OF 1
COLLECTOR: MIKE EHRBOST	COMPANY CONTACT: TABOR, CL	TELEPHONE NO.: 373-3981	PROJECT COORDINATOR: SHRUM, A	PRICE CODE: C03	DATA TURNAROUND
SAMPLING LOCATION: Sample Outlet METER DRAIN PORT	PROJECT DESIGNATION: SX Porewater Extraction Test Project, Stage III (Porewater and QC Sample		SAF NO.: V13-006	AIR QUALITY: ☐	60 Days / 120 Days
ICE CHEST NO.: TFVS-09-007	FIELD LOGBOOK NO.: N/A	ACTUAL SAMPLE DEPTH: N/A	COA: N/A	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
SHIPPED TO: 222-S Lab Operations	OFFSITE PROPERTY NO.		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 may or may 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

PRESERVATION	HNO3 to pH <2	Cool~4C
HOLDING TIME	6 Months	28 Days/48 Hours
TYPE OF CONTAINER	G/P	G/P
NO. OF CONTAINER(S)	1	1
VOLUME	500mL	~~500mL~~ 200mL AE 1-23-14
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS 1-23-14 MW	SEE ITEM (2) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B2T092	WATER	1-23-14	0945		X

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM: [illegible] DATE/TIME: 1-23-14 11:00	RECEIVED BY/STORED IN: Shawn Hodda DATE/TIME: 1-23-14 11:00	(1) RADISO_ICPMS (TF) {Neptunium-237, Technetium-99, Thorium-230, Thorium-232, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238}; (2) IC Anions - 9056 {2-Hydroxyacetate, Acetate, Bromide, Chloride, Fluoride, Formate, Nitrate, Nitrite, Oxalate, Phosphate, Sulfate}; ① SAMPLE CONSISTS OF ~125 ML ② SAMPLE CONSISTS OF ~ 75 ML
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:	
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	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 10/1/2013

A-6003-618 (REV 2)

222-S	SAMPLE RECEIPT AND CHAIN OF CUSTODY VERIFICATION CHECKLIST	ATS-LO-090-101 Rev 06.6

Date Samples Received: 2-23-14 8LH - 2.23.14 Group #: _____

Number of Samples: 2

Sample Custodian: [signature]

Sample Custodian to Complete:

Action	Yes	No	N/A	Comments
RSA/COC provided?	✓			
RSR provided?	✓			
Verify GKI is complete			✓	☐ In Project File
Received from an alpha facility?		✓		☐ Contact PC for approval to release
Check that outer custody seal is intact, if present	✓			
Record cooler temperature in centigrade, as appropriate	-0.8			☐ Check if no cooler and/or no ice
Samples are intact and in good condition	✓			If No, provide comments below
Verify that COC or RSA is accurate and complete, containing the following information:				
• Client name and client sample number	✓			
• Date and time of sampling	✓			
• Sampling location or origin	✓			
• Container type, size, and number	✓			
• Preservatives (if used) are noted on the COC/RSA and sample bottle	✓			
• Analysis request is clear	✓			
• Signature of persons relinquishing and receiving samples	✓			
• Date and/or time of sample custody exchange	✓			
Verify that sample numbers on containers match the COC and/or RSA	✓			
Samples stored properly (e.g., refrigeration)	✓			

Notify the PC immediately if any problems are noted. Any "No" checked boxes require PC resolution. For WRPS samples, the initials block below is completed by the responsible WRPS PC.

Samples acceptable for release? Yes PC/SC Initials 8LH Date 2-23-14

If No, comment on communication and resolution: 8LH 2.23.14

Other Comments:

A-6005-302 (REV 3)

ENERGYSOLUTIONS

ENERGY SOLUTIONS, WESTERN OPERATIONS

Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: Get Tag of water level and sediment in C88

DATE: 01-27-14

LOCATION: "SX" Farm Stage 3 Soil Water Extraction

EXCAVATION: DAN-13- 0036R1
U-DIG # 13140541

REPORT # 105

START CARD NO. SE48334

DECOMMISSION NO. AE22134

RWP: CO-762 Rev.6 SJHH-0080

SAMPLING SUMMARY

Sample #'s	Interval	%
1.N/A		
2.N/A		
3.N/A		
4.N/A		

SITE/EQUIPMENT INSPECTION: Yes No

HHU CASE#1 HHU CAT #2 HHUXL#3

BOREHOLE SUMMARY

Borehole #__n/a___ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

Borehole #__n/a_____ Tubing ( ) @ to ft bgs; S.U.

GEOPHYSICAL LOGGING

Boring #	Interval	Type
1.	N/A	
2.		
3.		

TIME	WORK SUMMARY
0700	Safety meeting at ES office, Topic; Ladder Safety.
0740	TRAVEL TO SMURF... ACE-IN.
0830	PRE-JOB by R. FRANZEN FWS
0900	AT SX-FARM SITE LOCATION
—	REMOVE FLANGE FROM C88Z4... TAG WATER @
—	135.05' FRIM TOP OF FLANGE, TAG SEDIMENT
—	@ 135.70' FROM TOP OF FLANGE. FLANGE IS 3'-2" FROM
—	TOP OF 2 5/8" CASING.
0940	TASK COMPLETE LEAVING SITE FOR TX-FARM.
	N/A

OPERATOR/LICENSE: Amos/1224
ES SUPPORT, Ehrgott
NCO:, RUBEN, JILL
HPT: CRASER
FWS: Franzan,

WEATHER: Over Cast 35 degrees

DOWNTIME: NONE

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: TFC-WO-13-2460 DOW-PL-36472-OP-0002 ECN- 13-000390

REPORT BY: MIKE ERGOTT
TITLE : *ES TECHNICAL PREPARER*
SIGNATURE: Mike Ehrgott

REVIEWED BY: Penny Berlin
TITLE: *ES TECHNICAL REVIEWER*
SIGNATURE: P C Berlin **DATE:** 1/29/14

10/06/09 Rev 1

This page intentionally left blank.

APPENDIX I

GEOPHYSICAL LOGGING IN THE 241-SX TANK FARM, JULY 2013

This page intentionally left blank.

Geophysical Logging in the 241-SX Tank Farm, July 2013

by

Russ Randall, PhD

to

Energy*Solutions*
Richland, Washington 99354

July 2013

Three Rivers Scientific
3740 Grant Loop
West Richland, Washington 99353

Geophysical Logging in the 241-SX Tank Farm, July 2013

1 Introduction

Energy*Solutions* (ES) and Three Rivers Scientific provided small diameter (slim hole) logging in support of field activities at the 241-SX Tank Farm. Logging surveys were conducted with three detectors: BGO and LaBr (both scintillation tools) and a neutron-neutron moisture tool. The surveys were used for correlation with logs from the SX-boreholes logged earlier in the year (C8759, C8761). This report includes the results of these surveys for the four probe holes installed at the investigation site (see Appendix A).

The BGO and LaBr instruments were run in combination during the logging run, and spectral data were recorded for both. The energy resolution of the LaBr is superior to the BGO, but the BGO efficiency for KUT naturals is superior to the LaBr. Thus the data from the BGO were used to measure gross gamma and concentrations of KUT, and the LaBr data were used to identify and measure the concentrations of selected radionuclides. The targeted radionuclide for this project was ^{137}Cs.

Both of the gamma tools were calibrated for the probe hole conditions present at the investigation site. The moisture tool was calibrated to both 6 and 8 inch-cased calibration standards. A casing thickness correction was applied to the extrapolated casing diameter calibrations for the moisture response.

2 Survey Results

Log surveys were recorded from the bottom of the probe hole (maximum survey depth) to ninety feet below ground surface (bgs). Zero depth reference is at ground surface. A daily repeat measurement was acquired to verify instrument repeatability. The main log and repeat intervals are presented on the same plot. The computed results of the main and repeat intervals were reviewed and the results agree within the uncertainty of the measurement counting statistics.

The survey results for each probe hole are presented as a depth versus concentration plot in Appendix A.

3 Geophysical Logging System

The logging system is a portable unit powered by either on-site generator (120v AC), or site-supplied power. A laptop computer allocated to the logging unit is used to monitor encoder depth positions, control the winch motor, and record detector responses.

3.1 Gross Gamma Calibration and Surveys

The gross gamma was obtained using the efficiency superior BGO instrument response. The settings of the detector components are fixed (i.e. set up during assembly, prior to calibration) and are not adjustable by the field-logging engineer. The detector gain and lower threshold are set to record gamma ray activity with energies between 20 and 3000 keV. By comparison, the highest gamma ray from naturally occurring radionuclides is from thorium-232 and occurs at 2614 keV. A supplied ^{60}Co source was used as a field verifier at the beginning and ending of each day's logging activities to check detector resolution (integrity) and energy calibration (amplifier gain).

The BGO detector was calibrated in gross gamma borehole calibration models located at the U.S. DOE Hanford site near Richland, Washington. Calibration data were collected in the two most appropriate (lowest concentration) gross gamma calibration zones (SBA and SBU). Calibration was performed with a section of the direct push casing (4-ft long) 0.37-in. thick (2.5-in. OD) installed over the detector (4-in. long). The calibration data are summarized in Table 1. The calibration units are pCi/g of equivalent Radium-226 (eRa-226). See Appendix B for the calibration certificate.

Table 1. Gross Gamma Calibration Data

Calibration Model	Concentration eRa-226 (pCi/g)	Dead-Time Corrected Gross Gamma Count-Rate [1, 2] (cps)
SBA	61.2	2517±2
SBU	186	7347±3.5
1-Count rates are mean of 50 sample measurements at 10-sec each. 2-BGO Detector system dead time is 7.2 microsec		

The BGO/LaBr gamma surveys were logged at 0.5 ft depth increments and 100 sec per station.. A spectrum of 1024 channels was collected each 0.5 feet from the bottom of the probe-hole to the targeted 90ft depth. The spectra were recorded in comma-delimited format with all spectra per file. Detector count rates were dead-time corrected and the gamma survey data were processed as gross gamma response to determine the concentration of equivalent Radium-226 (eRa-226) in pCi/g.

The dead time correction is a nonparalyzeable relationship (Knoll, 1979) and described by the following equation:

$$C_t = \frac{C_{obs}}{1 - \varepsilon \cdot C_{obs}}$$

Where:

C_t = the true or dead time corrected count rate in c/s
C_{obs} = the observed count rate in c/s
ε = the dead time factor of 7.2 μs.

3.2 Spectral Gamma Calibrations and Surveys

Calibration of the BGO logging system was performed in the four spectral gamma borehole calibration models located at the U.S. DOE Hanford Site near Richland, Washington and according to Hanford Site procedures for scintillation type spectral gamma ray borehole detectors (Randall & Stromswold, 1995). The four calibration models contain elevated concentrations of the naturally occurring radionuclides (potassium, uranium or radium in secular equilibrium with uranium, and thorium (i.e., KUT). The radionuclide concentrations are traceable to NIST standards, (Steele & George, 1986). Table 2 lists the radionuclide concentration in each of the gamma calibration models. The uncertainty is quoted at the 2-sigma (95 %) confidence level.

Table 2. Hanford calibration model values for KUT

Model	^{40}K Concentration (pCi/g)	^{226}Ra Concentration (pCi/g)	^{232}Th Concentration (pCi/g)
SBK	53.50 ± 1.67	1.16 ± 0.11	0.11 ± 0.02
SBU	10.72 ± 0.84	190.52 ± 5.81	0.66 ± 0.06
SBT	10.63 ± 1.34	10.02 ± 0.48	58.11 ± 1.44
SBM	41.78 ± 1.84	125.79 ± 4.00	39.12 ± 1.07

Calibration was performed with a section of the direct push casing (4-ft long) 0.37-in. thick (2.5-in. OD) installed over the detector (4-in. long). Performing the calibration with the casing is more rigorous than calibration in an open hole and applying correction to account for the presence of the direct push casing.

During logging the gamma peak at 1461 keV from potassium (K-40) is almost always present as the dominant peak in each spectra. The second best peak is the 2614 keV peak from ^{232}Th. Both of these peaks are used to monitor for spectra gain changes. During data processing the spectra gain is adjusted to track the reference gamma peaks.

Borehole survey spectra (100 seconds each) were measured each 0.5 feet between the selected depth intervals in move-stop-acquire logging mode. The results are presented on the plot for each of the corresponding probe holes.

3.3 Spectral Photo Peak Calibrations and Surveys

The LaBr spectral data are processed differently than the BGO data, and thus the LaBr calibration is different. The LaBr calibration and log data processing is performed in the same manner that the High Purity Germanium (HPGe) log data are analyzed (Randall 1994). The basic concept involves the non-linear least square fitting of a linear background plus a Gaussian photo

peak over a small region of the spectra containing the target gamma ray. The discussion in this report will cover the target gamma ray of ^{137}Cs (661 keV), but the same technique can be applied to any other gamma ray.

The SBU calibration model was used to measure the LaBr detector efficiency for the 609 keV peak from a daughter product of ^{238}U. The gamma ray detection efficiency of LaBr is a function of energy, thus a method of correcting the measured efficiency at 609 to the efficiency at 661 keV was developed. Monte Carlo N-Particle (MCNP) (RSICC) code for making Monte Carlo gamma transport calculations was used to compute the ratio of detector efficiencies between 609 and 661 keV. This ratio is then applied to the measure efficiency at 609 keV to obtain the ^{137}Cs gamma ray efficiency. The tool geometry of the modeling was the same used in the SBU calibration, and the source was set to both a 609 and 661 keV distributed throughout an SBU matrix.

The dead time for the LaBr instrument was measured to be 1.06μs. The measured detector efficiency for the 661 keV is 0.588 (c/s)/pCi/g (Appendix B contains the calibration certificate). The measured Full Width Half Maximum (FWHM) % for the ^{137}Cs photo peak is 4.17% at 661 keV.

The log data processing for ^{137}Cs is performed using a MathCad file. The steps to process the data are the following:

1. The energy calibration is established.
2. Based upon the 661 keV energy, the predicted peak channel is computed from the energy calibration.
3. A MathCad file is used to fit a linear background plus a Gaussian (with the energy computed centroid, and established peak width) to each spectral record.
4. Within the same MathCad file the photo peak count rate is computed, dead time corrected, the calibration coefficients are applied and the ^{137}Cs concentrations and depths are output to a comma-delimited file.
5. Survey plots are made with only those computed ^{137}Cs that are above minimum detect levels (mdl), which is conservatively set at 0.4 pCi/g, based upon statistical merits of the fitting.

4 Conclusion

Scintillation gross, spectral gamma, and moisture survey logs were collected in 4 probe holes installed in the 241-SX Tank Farm. All probe holes were pushed to their target depth. All probe holes were pushed to approximately 150 feet in depth.

No ^{137}Cs, above mdl, was identified in the 4 probe holes logged. Thus the ^{137}Cs plot tracks are blank; refer to plots in Appendix A.

5 References

Knoll, G. (1979), "Radiation Detection and Measurement", Copyright 1979 by John Wiley & Sons, Inc. ISBN "0-471-49545-X."

Randall, Russel R. PhD and Stromswold, David C. PhD, 1995, "Procedures for Calibrating Scintillation Gamma-Ray Well Logging Tools Using Hanford Formation Models", Westinghouse Hanford Co., Richland, WA.

Steele, W. Douglas and George, David C., 1986, "Field Calibration Facilities for Environmental Measurement of Radium, Thorium, and Potassium", Bendix Field Engineering Corp., Grand Junction, CO.

Randall, Russel R., 1994, "Calibration of the Radionuclide Logging System Germanium Detector", Westinghouse Hanford Co., Richland, WA

RSICC Computer Code Collection, MCNP4B2, "Monte Carlo N-Particle Transport Code System," Transport Methods Group Los Alamos National Lab, Los Alamos, New Mexico, distributed by Oak Ridge National Lab.

Appendix A

Gamma Survey Results

Gross gamma, KUT spectral, ^{137}Cs, and moisture responses are shown in the survey plots for the four probe holes installed in the 241-SX Tank Farm. All detector count rates were dead-time corrected and the results were converted using the calibration coefficients. The plots, with header information, follow.

SX-Farm C8823 Header Information

Small Diameter –Moisture Survey

Probehole:	C8823	Log Date:	July 2013
Project:	SX Farm	Depth Ref:	Ground Surface
Northing:	134133.30	Elevation:	199.56 m
Easting:	566824.06		654.72 ft.

1 Repeat/Overlap Intervals

Gamma:	143.5-148.5	Moisture:	no repeat

2 Observations

Gamma:

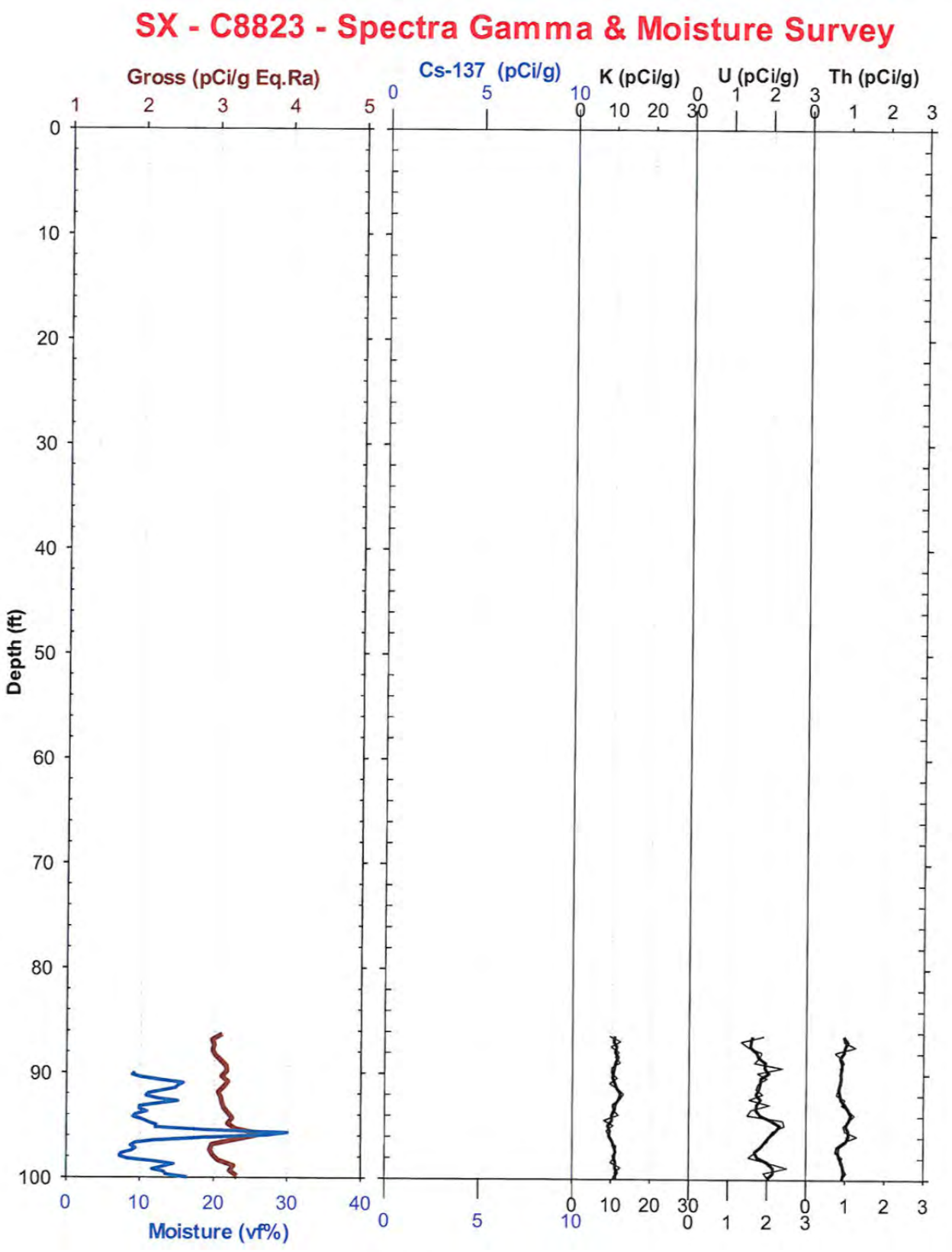
No Cs-137 is observed in this borehole. The gross gamma threshold is set at 50keV and therefore responsive to the presence of Cs-137.

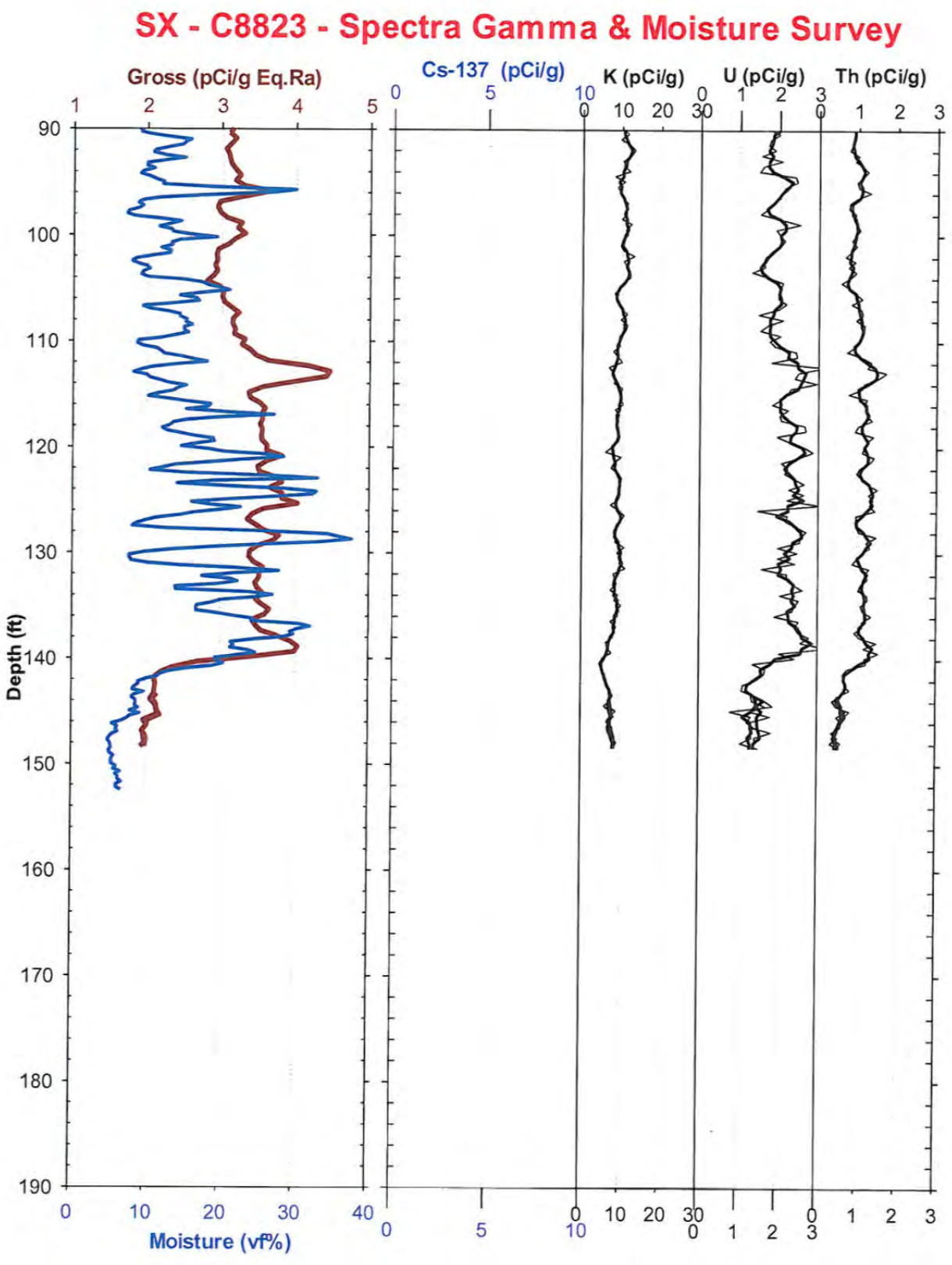
Moisture:

Moisture values range from 3-38%.

3 Calibration Certificates

Moisture	
Date:	Jan 25, 2013
Electronic File:	N2_097_2013-v0.zip
Gamma BGO	
Date:	Feb 4, 2013
Electronic File:	BGO-1_2013-v0.zip
LaBr	
Date:	Sep 13, 2012
Electronic File:	LaBr-1_2013-v0.zip


SX - C8823 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)


SX - C8823 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)

SX-Farm C8824 Header Information

Small Diameter –Moisture Survey

Probehole:	C8824	Log Date:	July 2013
Project:	SX Farm	Depth Ref:	Ground Surface
Northing:	134133.16	Elevation:	199.58 m
Easting:	566825.33		654.78 ft.

5 Repeat/Overlap Intervals

Gamma:	143.5-148.5	Moisture:	152.5-147.5

6 Observations

Gamma:

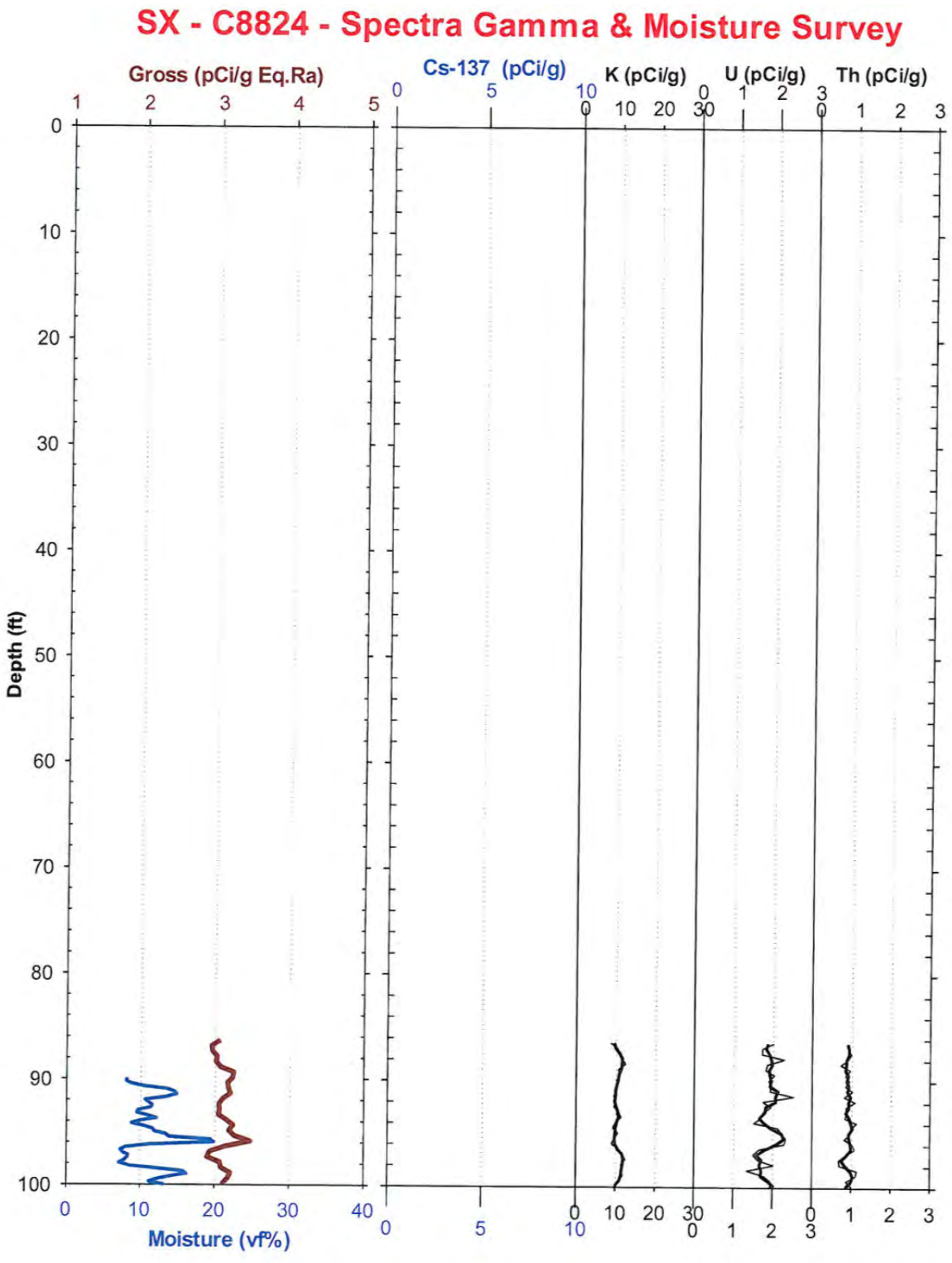
No Cs-137 is observed in this borehole. The gross gamma threshold is set at 50keV and therefore responsive to the presence of Cs-137.

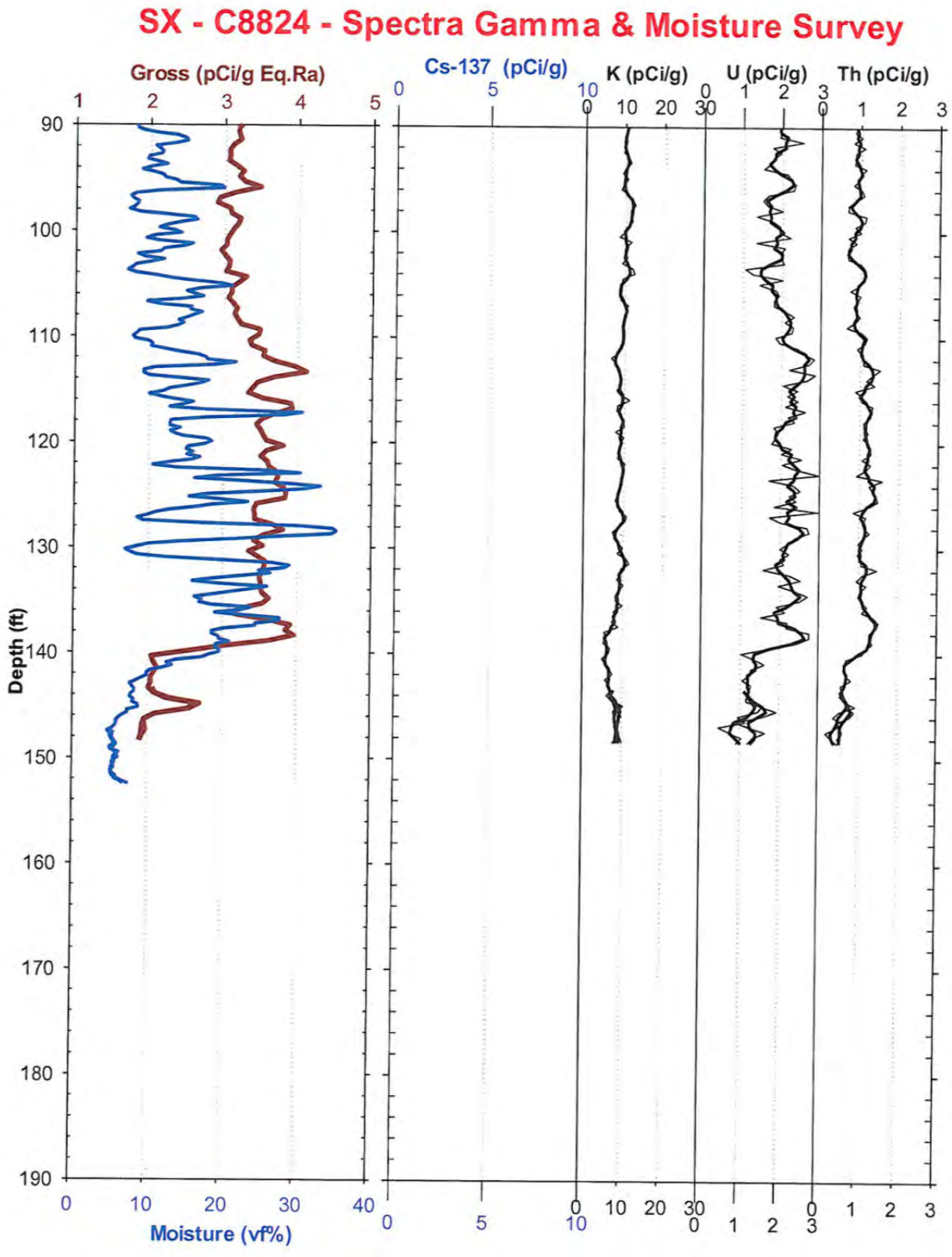
Moisture:

Moisture values range from 3-38%.

7 Calibration Certificates

Moisture	
Date:	Jan 25, 2013
Electronic File:	N2_097_2013-v0.zip
Gamma BGO	
Date:	Feb 4, 2013
Electronic File:	BGO-1_2013-v0.zip
LaBr	
Date:	Sep 13, 2012
Electronic File:	LaBr-1_2013-v0.zip


SX - C8824 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)


SX - C8824 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)

SX-Farm C8825 Header Information

Small Diameter –Moisture Survey

Probehole:	C8825	Log Date:	July 2013
Project:	SX Farm	Depth Ref:	Ground Surface
Northing:	134130.76	Elevation:	199.48 m
Easting:	566825.13		654.45 ft.

9 Repeat/Overlap Intervals

Gamma:	143.5-148.5	Moisture:	152.5-147

10 Observations

Gamma:

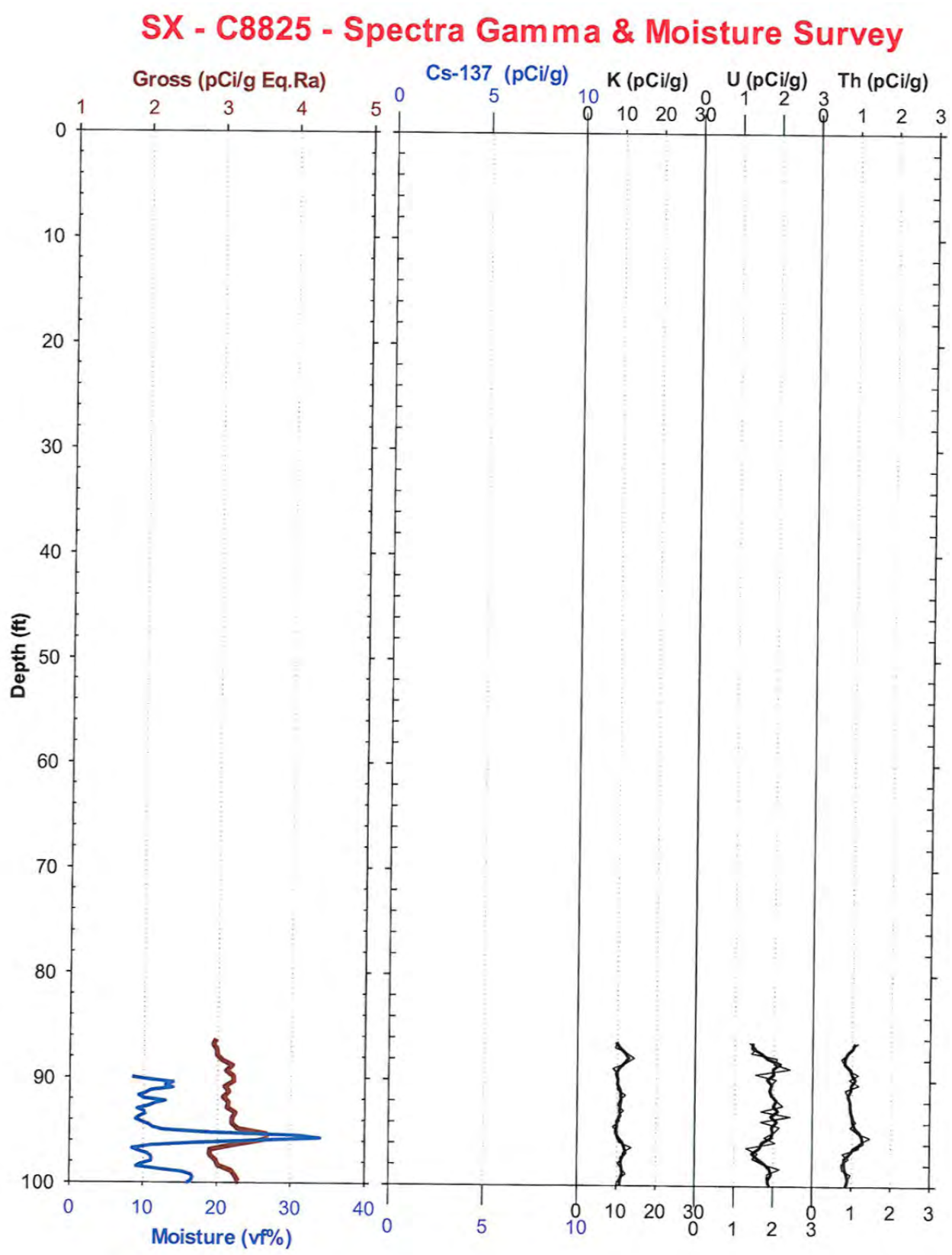
No Cs-137 is observed in this borehole. The gross gamma threshold is set at 50keV and therefore responsive to the presence of Cs-137.

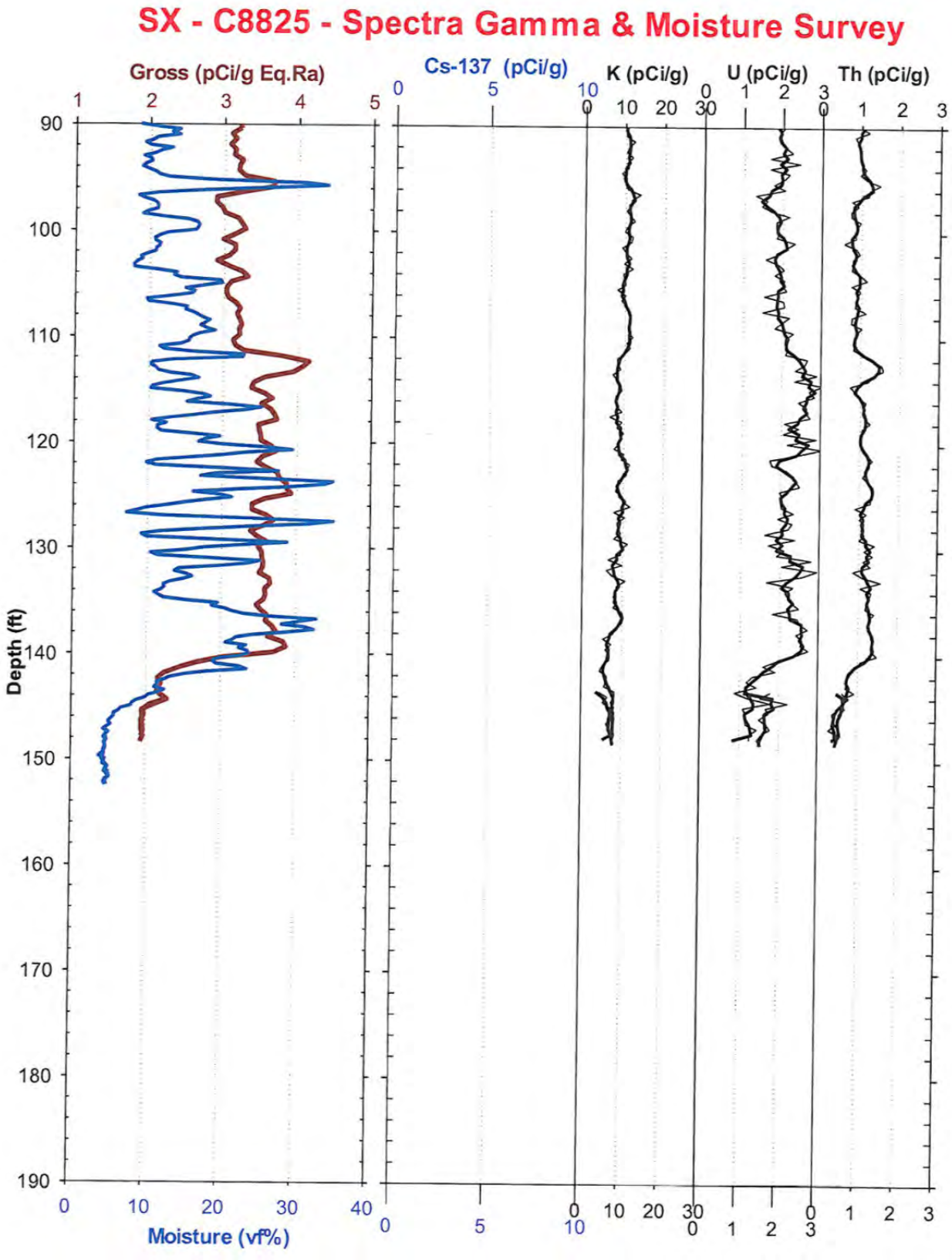
Moisture:

Moisture values range from 3-38%.

11 Calibration Certificates

Moisture	
Date:	Jan 25, 2013
Electronic File:	N2_097_2013-v0.zip
Gamma BGO	
Date:	Feb 4, 2013
Electronic File:	BGO-1_2013-v0.zip
LaBr	
Date:	Sep 13, 2012
Electronic File:	LaBr-1_2013-v0.zip


SX - C8825 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)


SX - C8825 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)

SX-Farm C8826 Header Information

Small Diameter –Moisture Survey

Probehole:	C8826	Log Date:	July 2013
Project:	SX Farm	Depth Ref:	Ground Surface
Northing:	134130.78	Elevation:	199.44 m
Easting:	566823.90		654.32 ft.

13 Repeat/Overlap Intervals

Gamma: 143.5-148.5 Moisture: none

14 Observations

Gamma:

No Cs-137 is observed in this borehole. The gross gamma threshold is set at 50keV and therefore responsive to the presence of Cs-137.

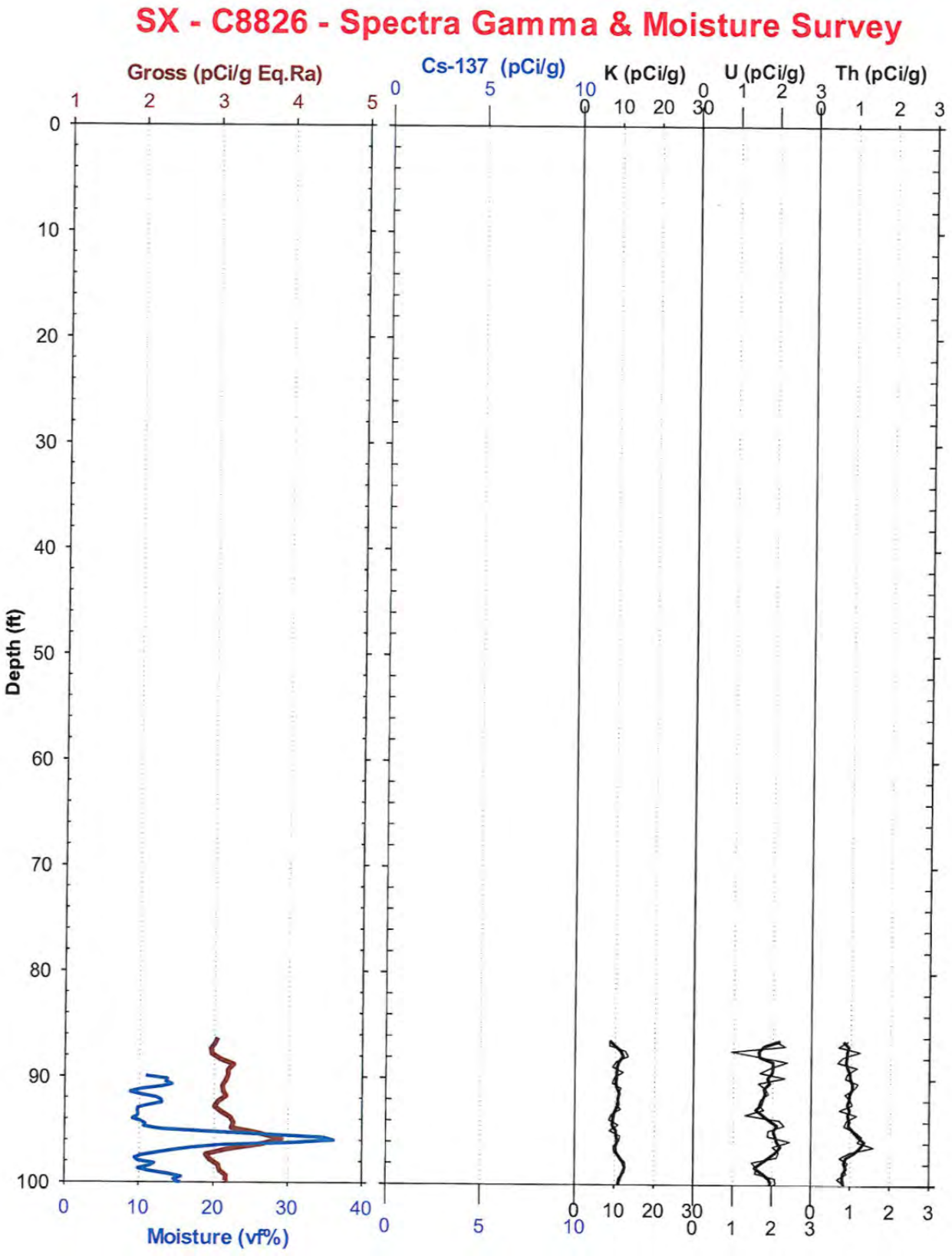
Moisture:

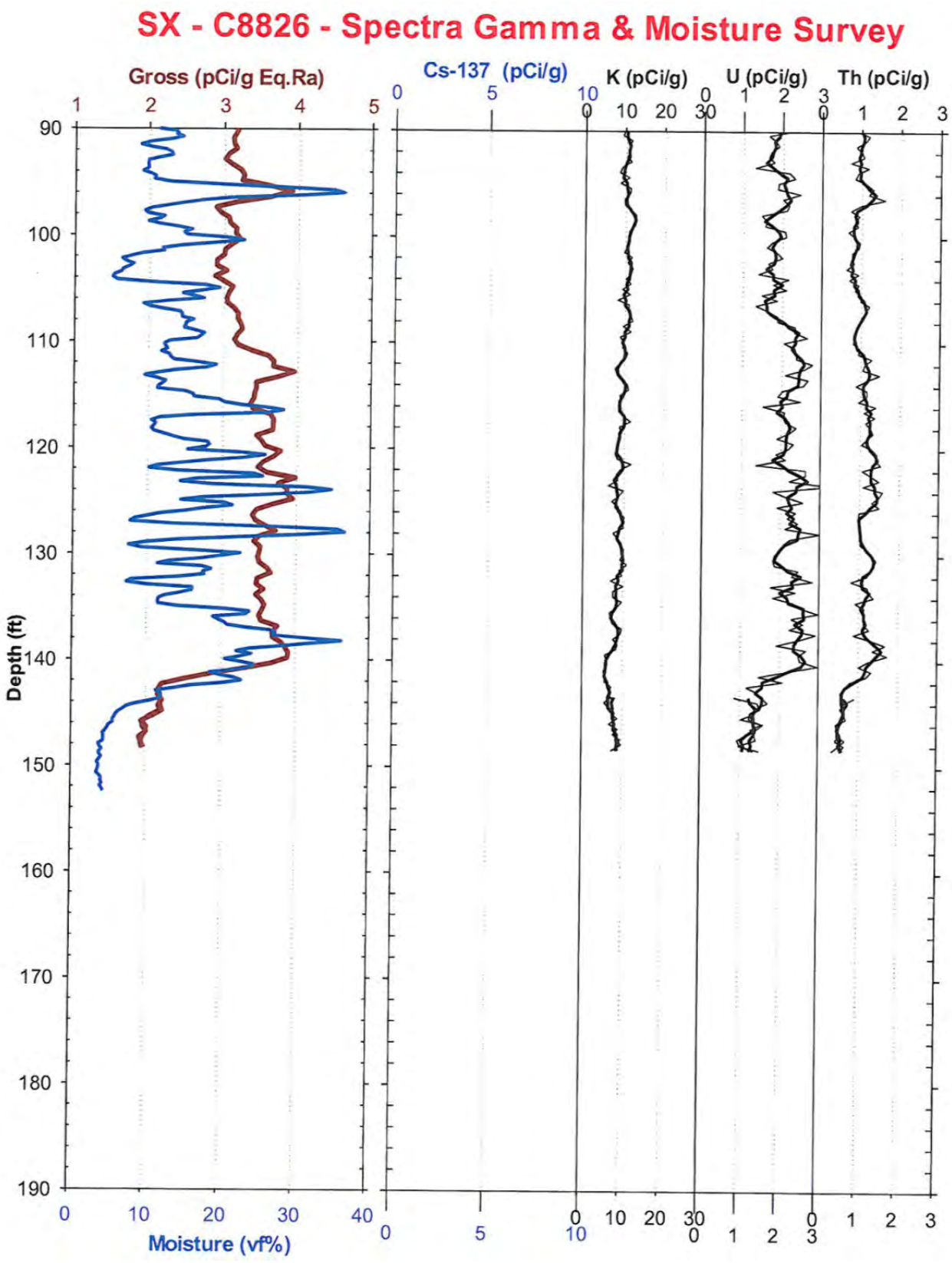
Moisture values range from 3-36%.

15 Calibration Certificates

Moisture	
Date:	Jan 25, 2013
Electronic File:	N2_097_2013-v0.zip
Gamma BGO	
Date:	Feb 4, 2013
Electronic File:	BGO-1_2013-v0.zip
LaBr	
Date:	Sep 13, 2012
Electronic File:	LaBr-1_2013-v0.zip

Page 17


SX - C8826 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)


SX - C8826 - Spectra Gamma & Moisture Survey
Gross (pCi/g Eq.Ra)
Cs-137 (pCi/g)
K (pCi/g)
U (pCi/g)
Th (pCi/g)
Depth (ft)
Moisture (vf%)

Appendix B

Calibration Certificates

The following pages contain the following calibration certificates:

1. BGO gross gamma
2. BGO KUT spectral
3. LaBr Cs-137 spectral
4. Neutron-neutron moisture
5. Moisture calibration extrapolated to push casing size

Certificate of Calibration
BGO-1
Feb 4, 2013

Data were taken at the Hanford KUT models on Feb 4, 2013. BGO-1 is the designated Scintillator tool. The SBA model was used for the gross gamma calibration. Fifty spectra were recorded for the model in order to perform statistical analysis. The observed deviations were seen to be near the theoretically predicted variation, refer to the files compressed: Stats.xls for this analysis.

The instrument was covered with 0.37 inch wall-thickness probe-tubing.

The coefficient analysis is determined by the algorithm described in the document WHC-SD-EN-TI-293, Rev. 0. The gross gamma calibration for equivalent ^{226}Ra in pCi/g is a regression function and is generally defined by:

$$Ra = a*GR + b$$

Where Ra is the Eq. ^{226}Ra in pCi/g, and GR is the observed gross gamma count rate (c/s), dead time corrected. The coefficients of a & b are the fit coefficients. A more physical relationship constrains the intercept (b) to a zero value. This computation yields improved response extrapolated to low concentrations of K, U, and Th (clean zones). The coefficients were determined to be:

$$a = .0243 \quad \text{Eq.}^{226}\text{Ra pCi/g / (c/s)}$$
$$b \equiv 0$$
$$\text{at energy threshold of 0keV}$$

$$a = .194 \quad \text{Eq.}^{226}\text{Ra pCi/g / (c/s)}$$
$$b \equiv 0$$
$$\text{at energy threshold of 800keV}$$

Digital files condensed as Cal_SD-GR-2_2010-v0.zip. This compressed file contains:

- Calibration raw data
- Spreadsheet data formatting

The undersigned certifies that the data archived in the file "Cal_BGO-1_2013-v0.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-293, "Procedures for Calibrating Scintillation Gamma-Ray Well Logging Tools Using Hanford Formation Models" and that the above stated calibration coefficients are correct and applicable for the tool BGO-1 effective Feb 4, 2013.

Signature: _____ Date: Feb 5, 2013
Russel Randall, PhD

Company: Three Rivers Scientific

Certificate of Calibration
BGO-1
Feb 4, 2013

Data were taken at the Hanford KUT models on Feb 4, 2013. BGO-1 is the designated Scintillator tool. Four models were used for Spectral KUT calibration. Fifty spectra were recorded for each model in order to perform statistical analysis. The observed statistical deviations were seen to be within the theoretically predicted variation, refer to the files compressed: Stats.XLS for this analysis. The instrument was covered with 0.37 inch wall thickness probe tubing.

The algorithm described in the document WHC-SD-EN-TI-293, Rev. 0, determines the coefficient analysis. Three energy windows are used for each potassium, uranium and thorium (K U & T), and these are:

K: 1320-1575 keV **U: 1650-2390 keV** **T: 2475-2765 keV**

The concentration for each of the three elements is a linear combination of the count rates in the three windows. The resulting coefficients for each of the three elements are:

Concentration-K =	**4.077*K**	**-3.382*U**	**2.957*T**
Concentration-U =	**0.0*K**	**1.351*U**	**-2.585*T**
Concentration-T =	**0.0*K**	**-0.034*U**	**1.655*T**

Where K U & T are the count rates (c/s) in the listed energy windows and the resulting concentration values are in pCi/g.

Digital files condensed as Cal_BGO-1_2013-v0.zip. This compressed file contains:

- Calibration raw data
- MathCad data analysis files
- Spreadsheet data formatting

The undersigned certifies that the data archived in the file "Cal_BGO-1_2013-v0.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-293, "Procedures for Calibrating Scintillation Gamma-Ray Well Logging Tools Using Hanford Formation Models" and that the above stated calibration coefficients are correct and applicable for the tool BGO-1 effective Feb 4, 2013.

Signature: _____ Date: Feb 5, 2013

Russel Randall, PhD.

Company: Three Rivers Scientific

Certificate of Calibration
LaBr-1
Cs-137 Photo Peak
Sep 13, 2012

Data were taken at the Hanford KUT models on Sep 13, 2012. LaBr-1 is the designated Scintillator tool. The SBA and SBU models were used for the gross gamma calibration. Ten spectra were recorded for each model in order to perform statistical analysis. The observed deviations were seen to be near the theoretically predicted variation, refer to the files compressed: Stats.xls for this analysis.

The instrument was covered with 0.33 inch wall-thickness probe-tubing.

The coefficient analysis is determined by the algorithm described in the document WHC-SD-EN-TI-292, Rev. 0. The photo peak stripping method of radionuclide calibration is generally defined by:

$$C = A/(\varepsilon * N)$$

Where C is the radionuclide concentration in pCi/g, A is the deadtime corrected photo peak count rate, ε is the detector efficiency, and N is the number of gamma rays emitted per decay. The coefficient ε is the fit coefficient. The LaBr scintillator has superior energy resolution, but internal to the crystal a small but observable radioactivity that produces a background. This background does not affect the photo peak stripping method. The coefficient was determined to be:

$$\varepsilon = .588 \quad (c/s) \;/\; pCi/g$$

Digital files condensed as Cal_ES-Cs-1_2012-v0.zip. This compressed file contains:

- Calibration raw data
- Spreadsheet data formatting
- MCNP output
- Mathcad files

The undersigned certifies that the data archived in the file "Cal_ES-Cs-1_2012-v0.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-292, "Calibration of the Radionuclide Logging System Germanium Detector" and that the above stated calibration coefficient is correct and applicable for the tool LaBr-1 effective Sep 13, 2012.

Signature: _____ Date: Sep 16, 2012
Russel Randall, PhD

Company: Three Rivers Scientific

Certificate of Calibration for
Instrument N-2_097

Jan 25, 2013

Data were taken in the Moisture models on Jan 25, 2013 for N-2_097 neutron-neutron moisture tool. The neutron source from DOE moisture tool ID of 78-1097 was used with the passive neutron detector probe from PNG.

Six models were used for moisture calibration, 3 for 6"casing and 3 for 8" casing. Repeated spectra were recorded for each model in order to perform statistical analysis. The observed statistical variation agreed with the theoretically predicted variation; refer to the file Stats.xls for this analysis.

The coefficient generation is determined by the algorithm described in the document WHC-SD-EN-TI-306, Rev. 0. The regression function used is a power law form and defined by:

$$V = a \cdot CR^{\alpha}$$

Where V is the formation moisture content in volume fraction water in vf units. One vf unit is 1% by volume water. The coefficients a and α are fit coefficients, and CR is the deadtime corrected observed total count rate, (c/s).

6" casing	8" casing
a = .0001671	a = .00009656
α = 2.202	α = 2.44

The undersigned certifies that the data archived in data file "N-2_097_2013.zip" were collected and evaluated in accordance with procedures WHC-SD-EN-TI-306, "Radionuclide Logging System In Situ Vadose Zone Moisture Measurement Calibration" and that the above stated calibration coefficients are correct and applicable for tool N-2_097, effective Jan 25, 2013.

Signature: Date:

Jan 30, 2013

Russel Randall, PhD
Three Rivers Scientific

Moisture Calibration Extrapolation to 2.5 Inch Borehole
Instrument N-2_097

Jan 25, 2013

Moisture calibration was performed in the Hanford physical models. These standards have 6 and 8 inch ID casings. The Tank Farm Direct Push borehole is cased with a 2.5 inch OD iron casing. The calibration for the moisture response is a function of borehole diameter.

The coefficient generation is determined by the algorithm described in the document WHC-SD-EN-TI-306, Rev. 0. The regression function used is a power law form and defined by:

$$V = a \cdot CR^{\alpha}$$

Where V is the formation moisture content in volume fraction water in vf units. One vf unit is 1% by volume water. The coefficients a and α are fit coefficients, and CR is the deadtime corrected observed total count rate, (c/s). A linear extrapolation was applied to determine the 2.5 inch borehole diameter.

2.51" borehole
a = .0002184
α = 2.00

The undersigned certifies that the analysis files are archived in the file "N-2_097_2013.zip" was evaluated in accordance with Energy Solutions procedures and that the above stated calibration coefficients are correct and applicable for tool N-2_097, effective Jan 25, 2013.

Signature: Date:

Jan 30, 2013

Russel Randall, PhD
Three Rivers Scientific

This page intentionally left blank.

APPENDIX J

VADOSE ZONE WELL DEVELOPMENT FALLING HEAD TEST DATA EVALUATION FOR BOREHOLES C8226, C8825, C8824, AND C8823

This page intentionally left blank.

GSI Water Solutions, Inc.

Technical Memorandum

To: Kent Reynolds

From: Kevin Lindsey, Ph.D., LHg, Jon Travis

Date: September 30, 2013

Re: Vadose Zone Well Development Falling Head Data Evaluation for Boreholes C8826, C8825, C8824, and C8823

The purpose of this technical memorandum (tech memo) is to report on GSI's review and evaluation of data collected during development of four vadose zone wells, designated C8826, C8825, C8824 and C8823. This review and evaluation was done to assess the effects of well development work on the breakdown of the compaction skin formed during drilling of the boreholes these wells are built in. These wells were installed by EnergySolutions Federal EPC, Inc. (EnergySolutions) staff in the vadose zone at a test site near the 241-SX Tank Farm. Well development work on these wells was done between August 15, 2013 and September 5, 2013.

This tech memo includes a summary of the data GSI worked with, our interpretations of that data, and recommendations for future work based on those interpretations. The work reported on herein was done under EnergySolutions Purchase Order #636148.

Well Characteristics

The wells were installed in boreholes drilled using hydraulic/vibratory push techniques. The wells were built for subsequent use in vadose zone vapor extraction tests. Based on well summaries supplied by EnergySolutions (Attachment 1), basic well specifications are as follows:

- All four wells have a 1 foot, 10 slot screen with a nominal inside diameter of 1.33 inches and outside diameter of 1.66 inches.
- In wells C8826, C8823, C8824, and C8825 the top of the 1-foot screen is 127.35 feet, 128.04 feet, 127.97 feet, and 127.16 feet below ground surface (bgs), respectively. A 4 to 5 foot sump is below the screen.
- In one of these wells, C8825, the 1-foot screen, and the underlying sump, is largely blocked by cement, with the well only open from 127.16 to 127.34 feet bgs.

8019 W. Quinault Avenue, Suite 201 Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 www.gsiws.com

Following installation of well screens, well development was done to break down the compacted material that accumulates on the boring walls as drill rods are pushed into the ground. For the purposes of this tech memo this material is referred to as the compaction skin.

Methods

The primary data set GSI used to prepare this tech memo consists of falling head data collected by EnergySolutions staff/contractor using a logging pressure transducer installed in each well during specific periods of time during well development. Falling head data was collected in an effort to assess the effectiveness of well development done to breakdown the compaction skin. The falling head tests were designed based on field experiments conducted in the spring of 2013. Field staff was provided with instructions based on the earlier field experiments and prepared jointly by GSI and EnergySolutions staff prior to the August/September field deployment.

Note: The spring 2013 field tests were done on wells with a 2-foot, 20 slot screen, not the 1-foot, 10 slot screen used in the four wells evaluated in this tech memo.

The falling head data evaluated in this tech memo was collected during and following well development generally as follows:

1. Prior to the start of development for a given well a pressure transducer was placed in the well. A two to three gallon slug of clean water was then poured into the well. The pressure transducer recorded the change in head of this slug as it was allowed to drain from the well. This established a pre-development, or baseline, effect of the compaction skin on the well by measuring the falling head.
2. Development then commenced using a surge and purge method where development water introduced into the well was agitated using a surge block.
3. Periodically during surging, development water was pumped or bailed (purged) from the well, the transducer reinstalled, and a two to three gallon slug of clean water was then poured into the well. Purging was intended to remove almost all water, and entrained development fines, from the well. Given that, in several cases during the development of wells C8826 and C8825, some development water was left in the wells prior to the pouring of the 2 to 3 gallon test slug into the well.
4. The pressure transducer recorded the change in head of this slug as it was allowed to drain from the well. This falling head data was then compared to the baseline falling head data to assess the potential impact of development on the breakdown of the compaction skin.
    a. The pressure transducer was programmed by field staff to record data logarithmically.
    b. Pressure transducer data was provided to GSI in digital form.

GSI prepared semi-log plots of the falling head data. For each well two semi-log plots were prepared, one where the initial head was normalized to common datum, and one where it was not. The hydrographs are shown in Attachments 2, 3, 4, and 5, and discussed further in the Data and Interpretations section. Comparison between baseline and subsequent falling head tests in each well are based predominantly on visual examination of the data, focusing on the period of time between the end of poring of the test slug into the well (generally between 80

8019 W. Quinault Avenue, Suite 201 Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 www.gsiws.com

and 100 seconds into the test) and 1,000 seconds. This time period was judged to be adequate for assessing the changes in falling head induced by development because: (1) the falling head slug was completely poured into the well within 100 seconds of the start of the test and (2) previous experience which suggested that 1,000 seconds generally was sufficient to determine if the previous round of development had an effect on the development skin.

Data and Interpretations

Introduction of Test Slug, All Wells

Visual examination of falling head hydrographs for all four wells (see Attachments 2, 3, 4, and 5) show that during the first 80 to 100 seconds of each test water levels rose. This is interpreted to show the pouring of the 2 to 3 gallon test volume into the boring. Loading (poring) of the test slug into the well is reflected in the erratically rising water levels commonly seen between 10 and 80 to 100 seconds on all hydrographs. Given that, the falling head portion of each test is taken as starting between approximately 80 to 100 seconds. The following discussion focuses on the data collected after 80 seconds as that data is interpreted to reflect only draining (the falling head) of the well, and hence providing the information needed to assess the progress of development and breakdown of the compaction skin coating the boring wall.

Well C8826, Falling Head

Development of borehole C8826 started 15 August and ended 28 August 2013. Nine rounds of surging and purging, each followed by a falling head test were completed following the first baseline test. Normalized and unnormalized hydrographs for these falling head tests are found in Attachment 2. Observations from these hydrographs show the following:

- Test 1 showed a relatively constant baseline pre-development falling head drop of approximately 23 feet between 100 and 1,000 seconds.
- The next three tests, test 2, 3, and 4, showed similar decline patterns, if at somewhat reduced rates.
    - This suggests that development had not yet led to the break-up of the compaction skin.
- Falling head tests 5, 7, 8, 9, 10, and 11 show a change in character relative to the prior tests. These later tests show very rapid early declines followed at approximately at the 200 second mark by a sharp reduction in fall rate. Test 6 was not completed due to an equipment malfunction.
    - These falling head patterns are interpreted to reflect initial success in breaking up the compaction skin, followed by replugging of either the borehole wall or the well screen.
    - Possible causes of replugging could be tied to insufficient purging of the well, and consequent removal of development generated fines, prior to the start of the falling head measurements. High pre-falling head test water levels in the well, commonly exceeding 20 feet for many of the slugs, suggest incomplete purging was common during work on this well.
    - Flattening of the decline curve could also be related to loss of driving head as the initial slug declines. We do not currently favor this interpretation as many of

8019 W. Quinault Avenue, Suite 201 Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 www.gsiws.com

these curves begin to again steepen, suggesting increased drainage rates, as time progresses; suggesting factors other than head are influencing the observed declines.

Well C8825, Falling Head

Development of borehole C8825 started 16 August and ended 29 August 2013. Three rounds of surging and purging, each followed by a falling head test were completed following the baseline test. Normalized and unnormalized hydrographs for these falling head tests are found in Attachment 3. Observations from these hydrographs show the following:

- Test 1 showed a relatively constant baseline pre-development falling head drop of approximately 25 feet between 100 and 1,000 seconds. This rate is similar to what is seen in the baseline for well C8826.
- Tests 2, 3, and 4 on the other hand show a significant reduction in falling head rate. This is interpreted to reflect plugging of the well during development.
- Plugging could be related to the fact that over 90 percent of the screened was later determined by EnergySolutions staff to be blocked by cement. In such a condition, development surging will have had little influence on the compaction skin as it would have limited hydraulic connection with the slug placed in the well for development.

Well C8824, Falling Head

Testing at borehole C8824 started and ended 4 September 2013. Three rounds of surging and purging, each followed by a falling head test were completed following the first baseline test. Normalized and unnormalized hydrographs for these falling head tests are found in Attachment 4. Observations from these hydrographs show the following:

- Test 1 baseline falling head displayed a step-like feature, initially displaying a rapid decline followed by a decrease in decline rate. This is similar to what is seen in later tests in well C8826.
- The step-like decline seen in the baseline falling head is not displayed in the data collected for Tests 2, 3, and 4, data collected after the start of development. These tests suggest that falling head rates were less after development, versus before development. In fact, these tests show a relatively stable water level in the interval between 100 and 1,000 seconds, suggesting little drainage is occurring. This suggests the well was not developed by surge and purge.
- A possible explanation for this may be related to well construction. The small slot size in this well (10 slot) may have influenced development by dissipating development energy. Dissipation of development energy may not result in breakdown of the compaction skin.
- The well may also have plugged during development. A small slot size screen could have been plugged by development generated particulates, blocking the entry of development generated fines into the screen so they could be removed during purging.

8019 W. Quinault Avenue, Suite 201 Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 www.gsiws.com

Well C8823, Falling Head

Testing at borehole C8823 started 29 August and ended 3 September 2013. Three rounds of surging and purging, each followed by a falling head test were completed following the first baseline test. Normalized and unnormalized hydrographs for these falling head tests are found in Attachment 5. Observations from these hydrographs show the following:

- Like the baseline test in well C8824, the Test 1 baseline falling head in well C8823 displays a step-like feature, initially displaying a rapid decline followed by a decrease in decline rate.
- The step-like decline seen in the baseline falling head is not displayed in the data collected for Tests 2, 3, and 4, data collected after the start of development. In fact, these tests show a relatively stable water level in the interval between 100 and 1,000 seconds, suggesting little drainage is occurring. This suggests the well was not developed by surge and purge.
- A possible explanation for this may be related to well construction. The small slot size in this well (10 slot) may have influenced development by dissipating development energy. Dissipation of development energy may not result in breakdown of the compaction skin.
- The well may also have plugged during development. A small slot size screen could have been plugged by development generated particulates, blocking the entry of development generated fines into the screen so they could be removed during purging.

Conclusions

Based on the data collected during development and falling head tests conducted on wells C8826, C8825, C8824, and C8823 break-down of the compaction skin is interpreted to have been incomplete for several reasons. These are interpreted to include any or all of the following reasons:

1. With incomplete development purging, development produced fines may not be removed from the well. These fines may then plug the screen and/or the borehole wall. This may have occurred in well C8826.
2. The small slot size (10 slot) used in these wells may have hindered development by preventing the movement of development produced fines into the well for removal by purging. Falling head patterns seen in wells C8826 and C8824 (initial rapid fall followed by a quick decrease in decline rate) show trends that suggest replugging of the screen and/or borehole wall during each test.
3. The small slot size in these wells may also have hindered development by dissipating development energy to the point that it had little influence on the compaction skin. Falling head patterns in well C8823, C8824, and C8826 (which commonly show no significant difference between successive development/purge events) show trends that are interpreted to show little or no effect on the development skin by well development.
4. In well C8825 physical plugging of the well screen by cement was a problem.

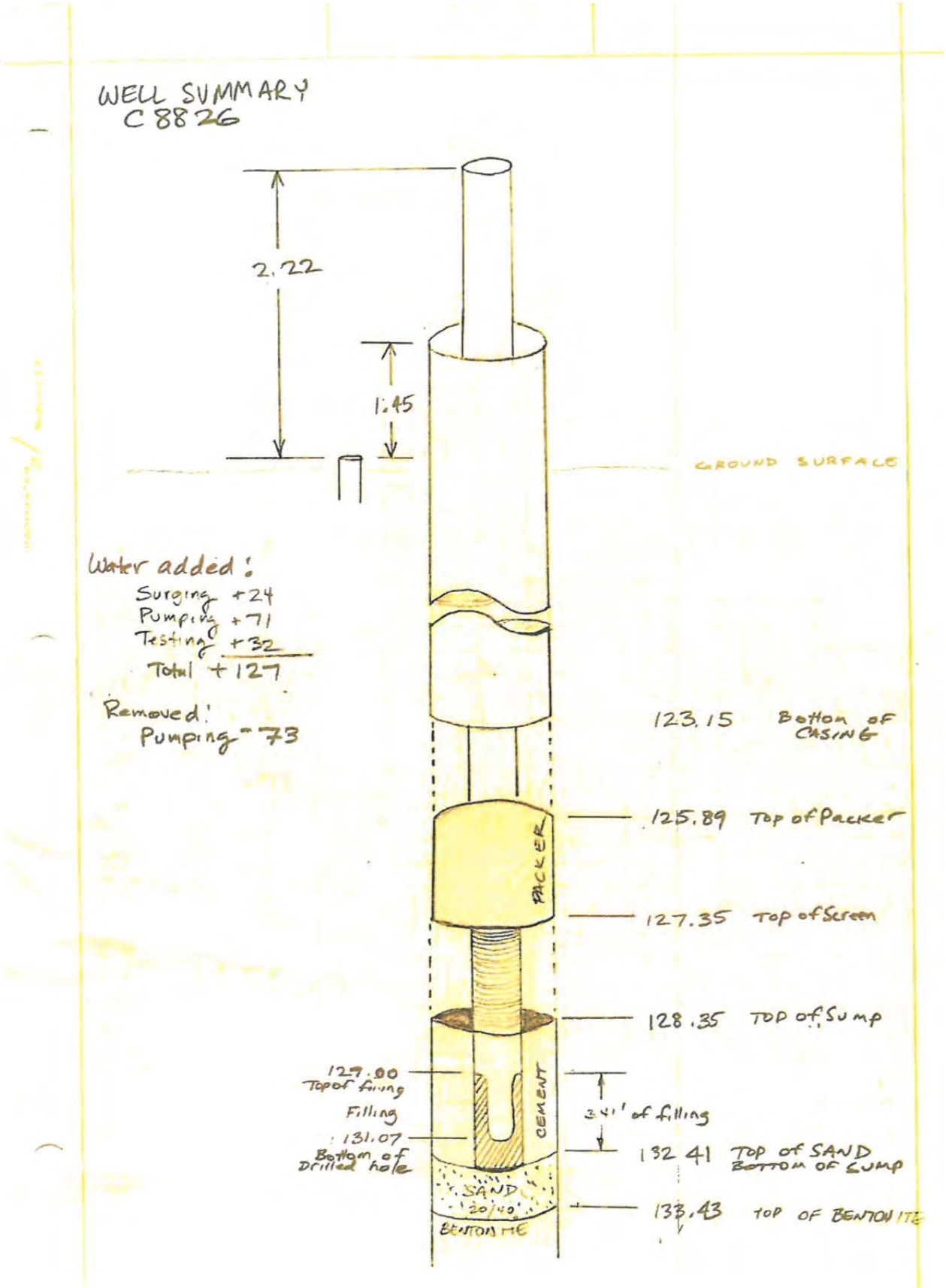
To conclude, we suspect that the change in well specifications between the spring tests and the August/September deployment compromised the development technique developed and field

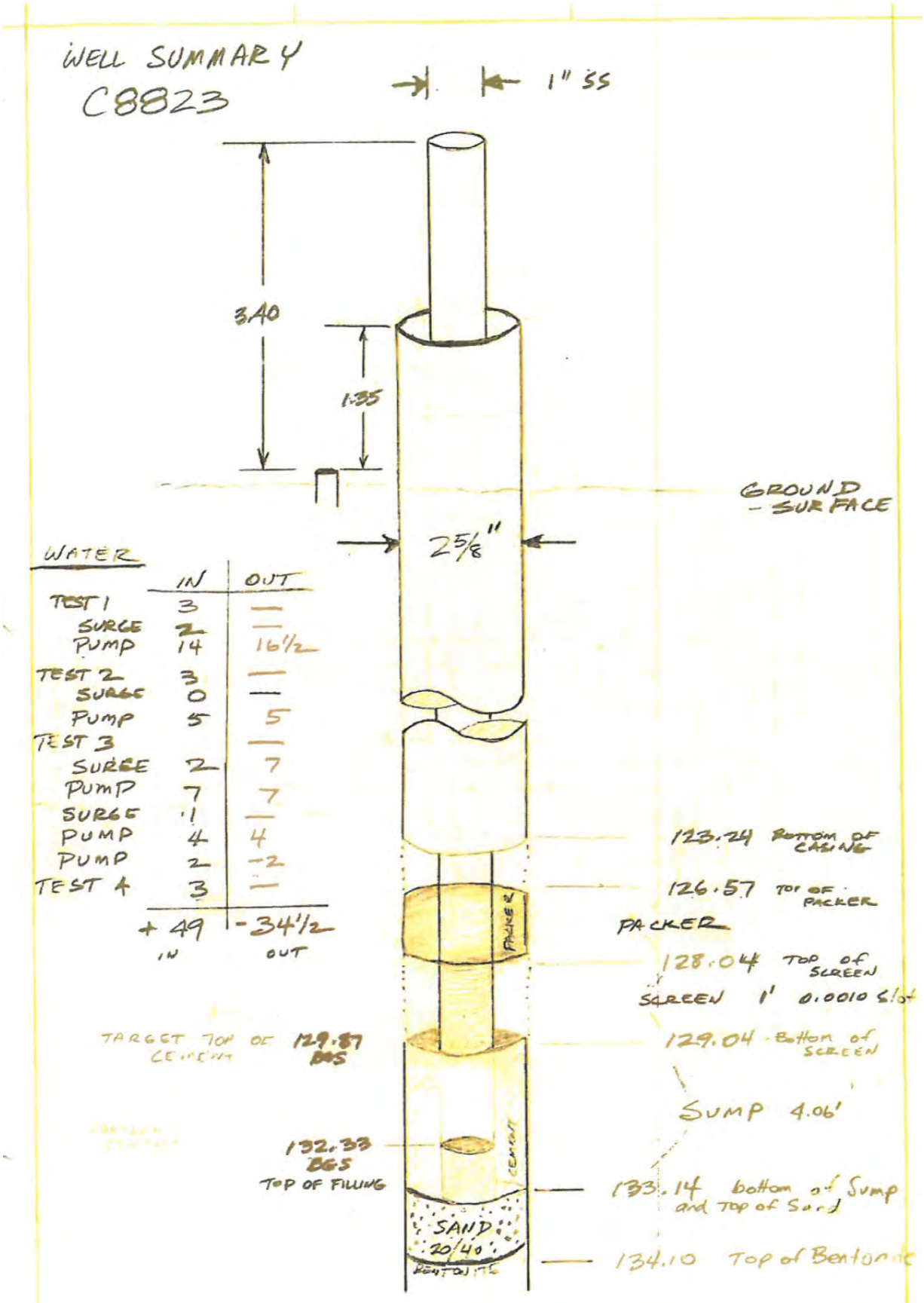
tested in the spring for larger screen openings and screened interval. In addition, periodic failure to completely purge development water, and entrained fines, likely contributed to difficulties encountered in the breakdown of the compaction skin. In future work of this type, especially where these small diameter wells are planned, we recommend that techniques and methods be tested on the planned well configuration, not a different configuration.

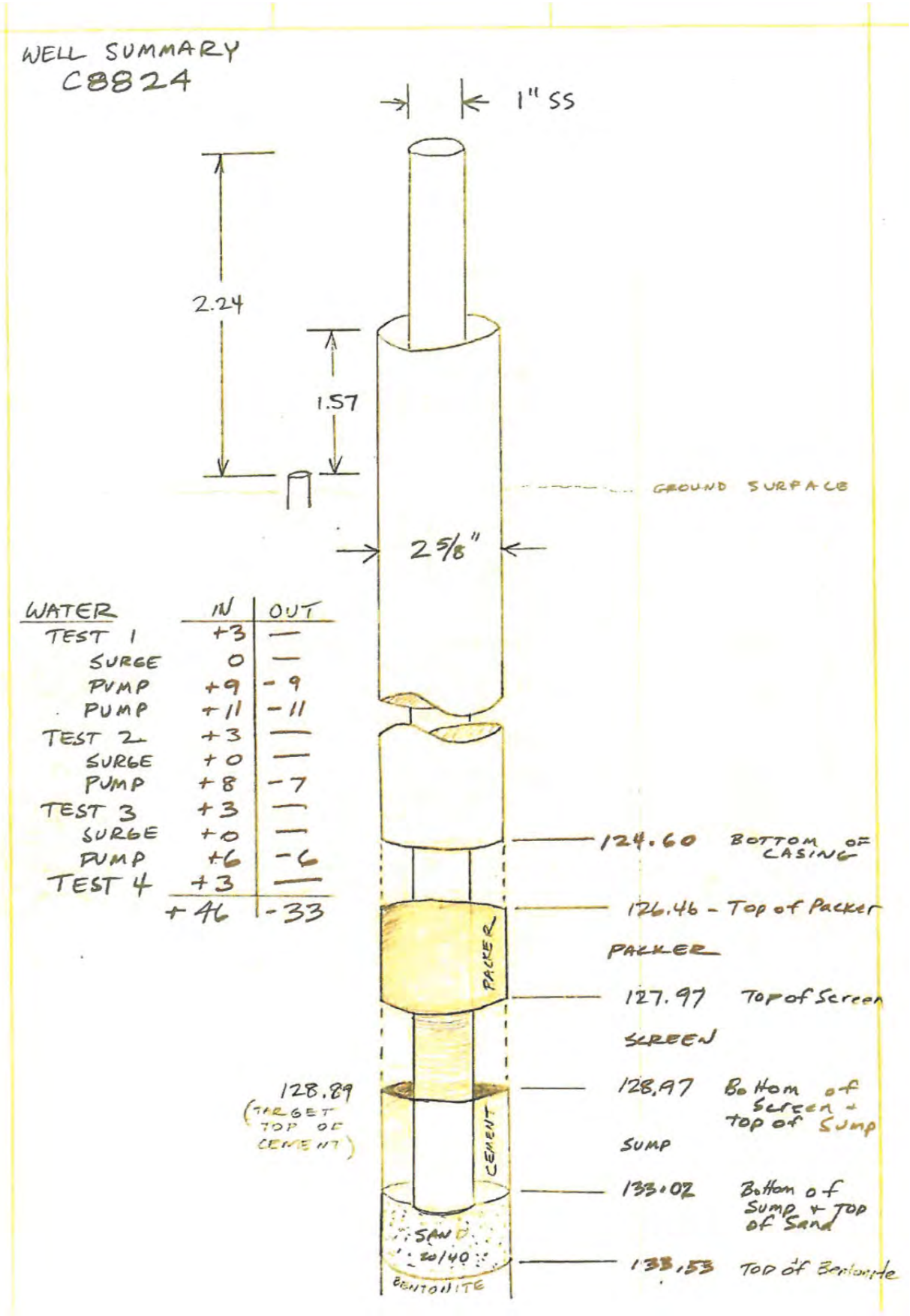
8019 W. Quinault Avenue, Suite 201 Kennewick, WA 99336 P: 509.735.7135 F: 509.735.7067 www.gsiws.com

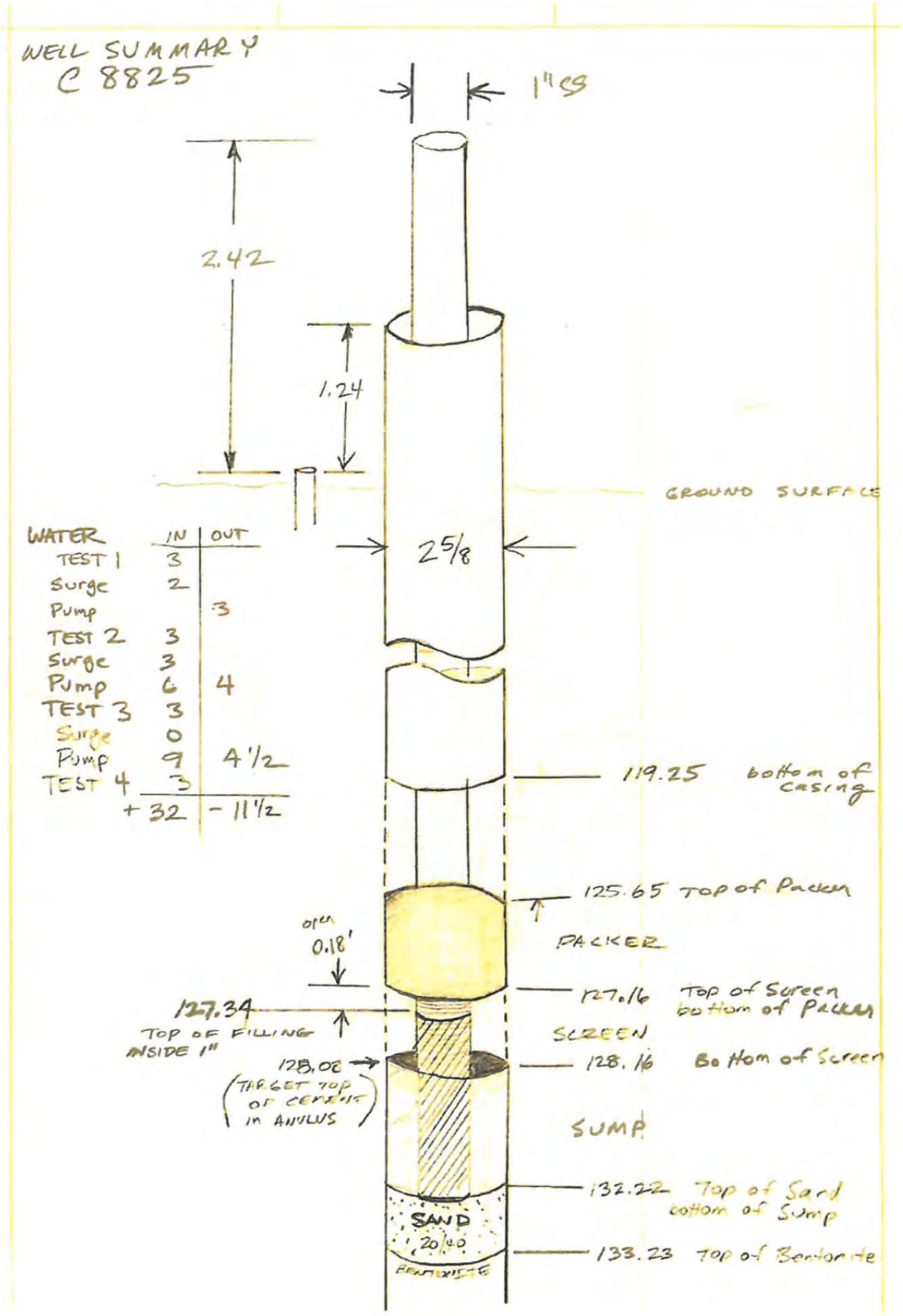
Attachment 1

Well construction summaries for wells C8823, C8824, C8825, and C8826


WELL SUMMARY
C 8826
2.22
1.45
GROUND SURFACE
Water added:
Surging +24
Pumping +71
Testing +32
Total +127
Removed:
Pumping -73
123.15 Bottom of CASING
125.89 Top of Packer
PACKER
127.35 Top of Screen
128.35 TOP of Sump
129.00 Top of filling
Filling
131.07 Bottom of Drilled hole
CEMENT
3.41' of filling
132.41 TOP of SAND BOTTOM OF SUMP
SAND
20/40
BENTONITE
133.43 TOP OF BENTONITE

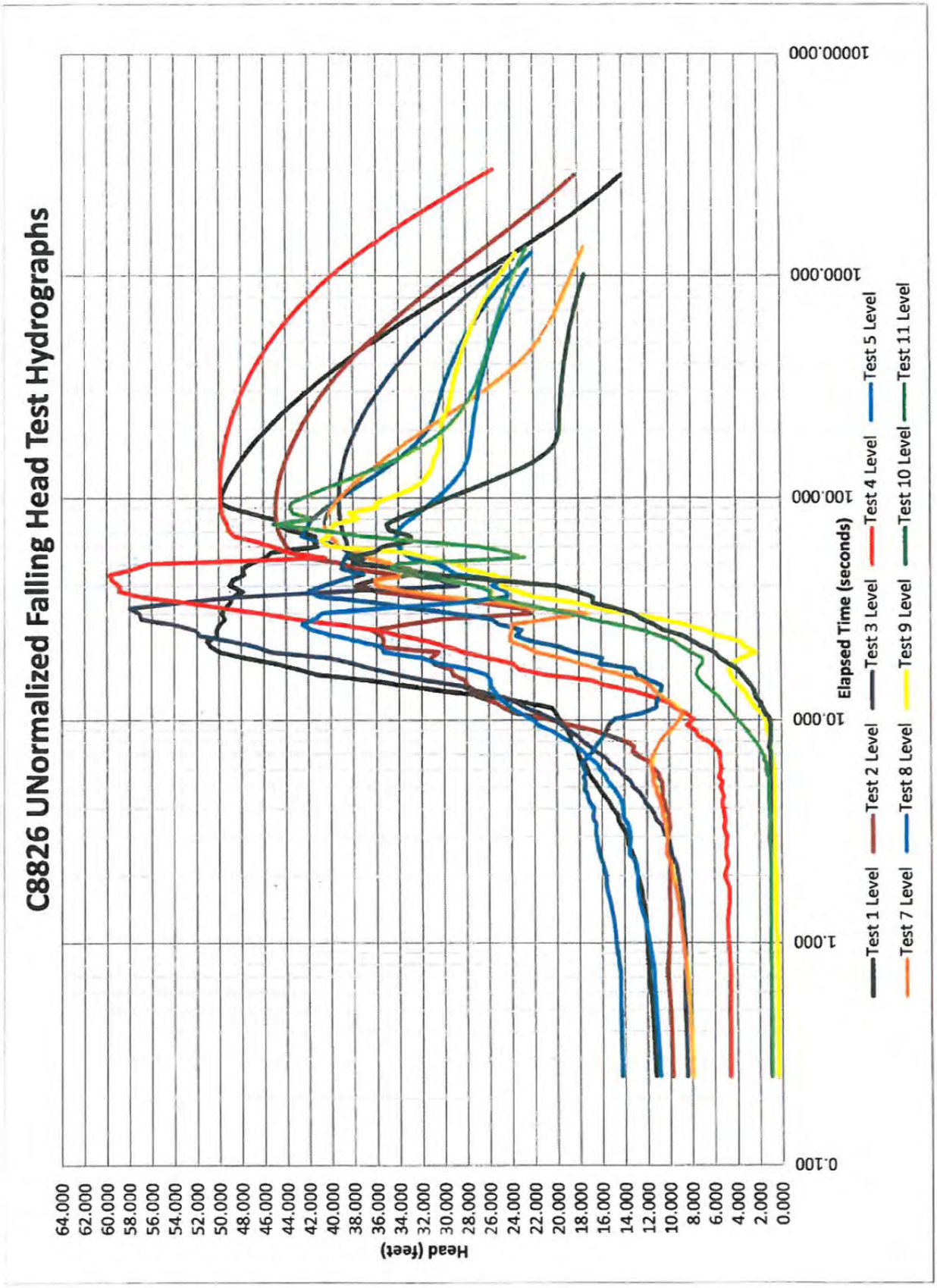

WELL SUMMARY
C8823
1" SS
3.40
1.35
GROUND SURFACE
2 5/8"
WATER
IN
OUT
TEST 1
3
—
SURGE
2
—
PUMP
14
16 1/2
TEST 2
3
—
SURGE
0
—
PUMP
5
5
TEST 3
—
SURGE
2
7
PUMP
7
7
SURGE
1
—
PUMP
4
4
PUMP
2
-2
TEST 4
3
—
+ 49
IN
-34 1/2
OUT
123.24 BOTTOM OF CASING
126.57 TOP OF PACKER
PACKER
128.04 TOP of SCREEN
SCREEN 1' 0.0010 Slot
129.04 Bottom of SCREEN
SUMP 4.06'
133.14 bottom of Sump and Top of Sand
134.10 Top of Bentonite
TARGET TOP OF CEMENT 129.87 BGS
132.33 BGS TOP OF FILLING
CEMENT
SAND 20/40
BENTONITE

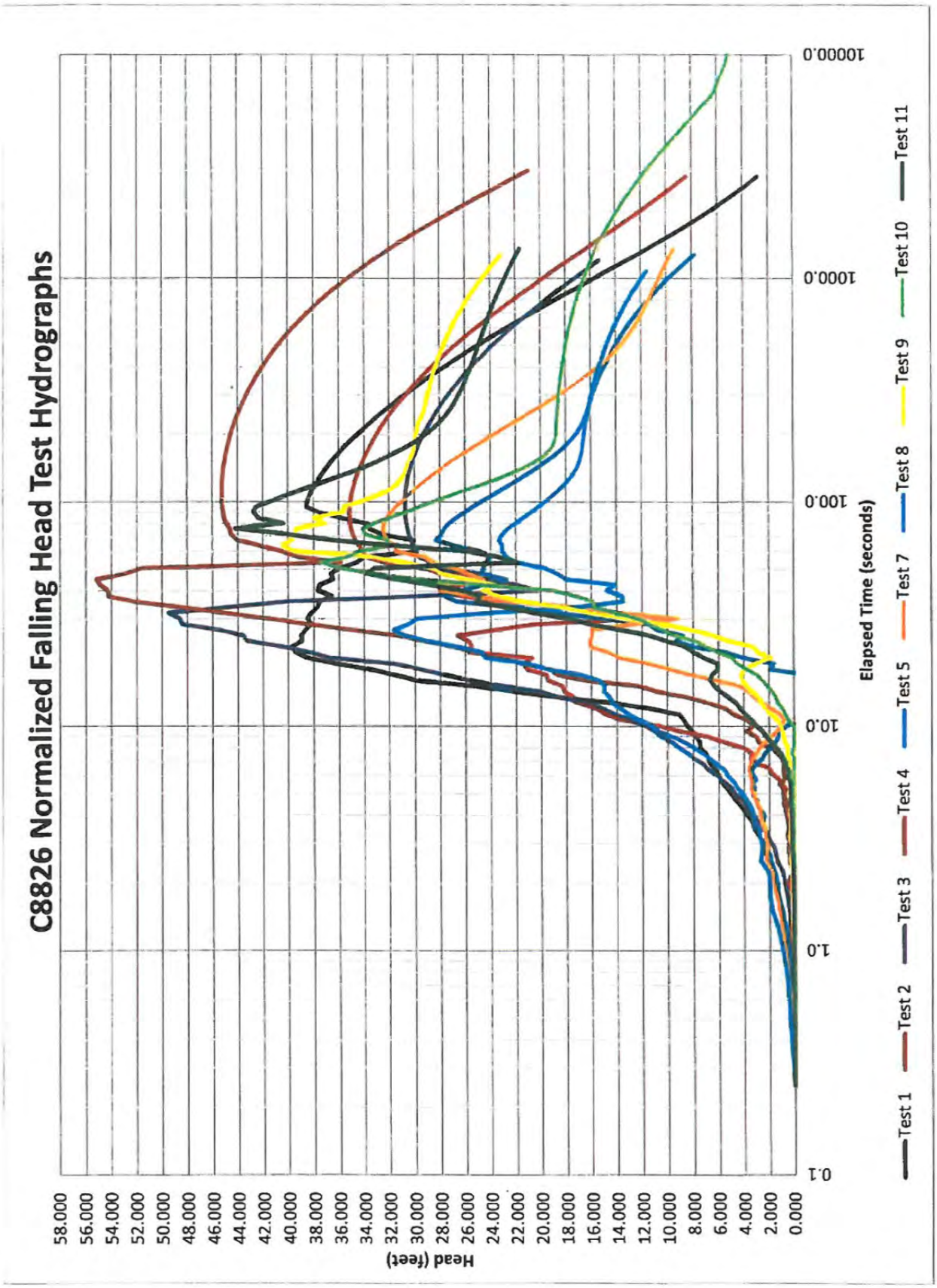

WELL SUMMARY
C8824
1" SS
2.24
1.57
GROUND SURFACE
2 5/8"
WATER IN OUT
TEST 1 +3 —
SURGE 0 —
PUMP +9 -9
PUMP +11 -11
TEST 2 +3 —
SURGE +0 —
PUMP +8 -7
TEST 3 +3 —
SURGE +0 —
PUMP +6 -6
TEST 4 +3 —
+46 -33
124.60 BOTTOM OF CASING
126.46 - Top of Packer
PACKER
PACKER
127.97 Top of Screen
SCREEN
128.89 (TARGET TOP OF CEMENT)
128.97 Bottom of Screen = Top of Sump
SUMP
CEMENT
133.02 Bottom of Sump + Top of Sand
SAND 20/40
133.53 Top of Bentonite
BENTONITE


WELL SUMMARY
C 8825
1" SS
2.42
1.24
GROUND SURFACE
2 5/8
WATER
IN
OUT
TEST 1 3
Surge 2
Pump :3
TEST 2 3
Surge 3
Pump 6 4
TEST 3 3
Surge 0
Pump 9 4 1/2
TEST 4 3
+ 32 - 11 1/2
119.25 bottom of casing
125.65 Top of Packer
PACKER
0.18'
127.16 Top of Screen
bottom of Packer
127.34
TOP OF FILLING INSIDE 1"
SCREEN
128.02
(TARGET TOP OF CEMENT IN ANNULUS
128.16 Bottom of Screen
SUMP
132.22 Top of Sand
bottom of Sump
SAND
20/40
133.23 Top of Bentonite

Attachment 2

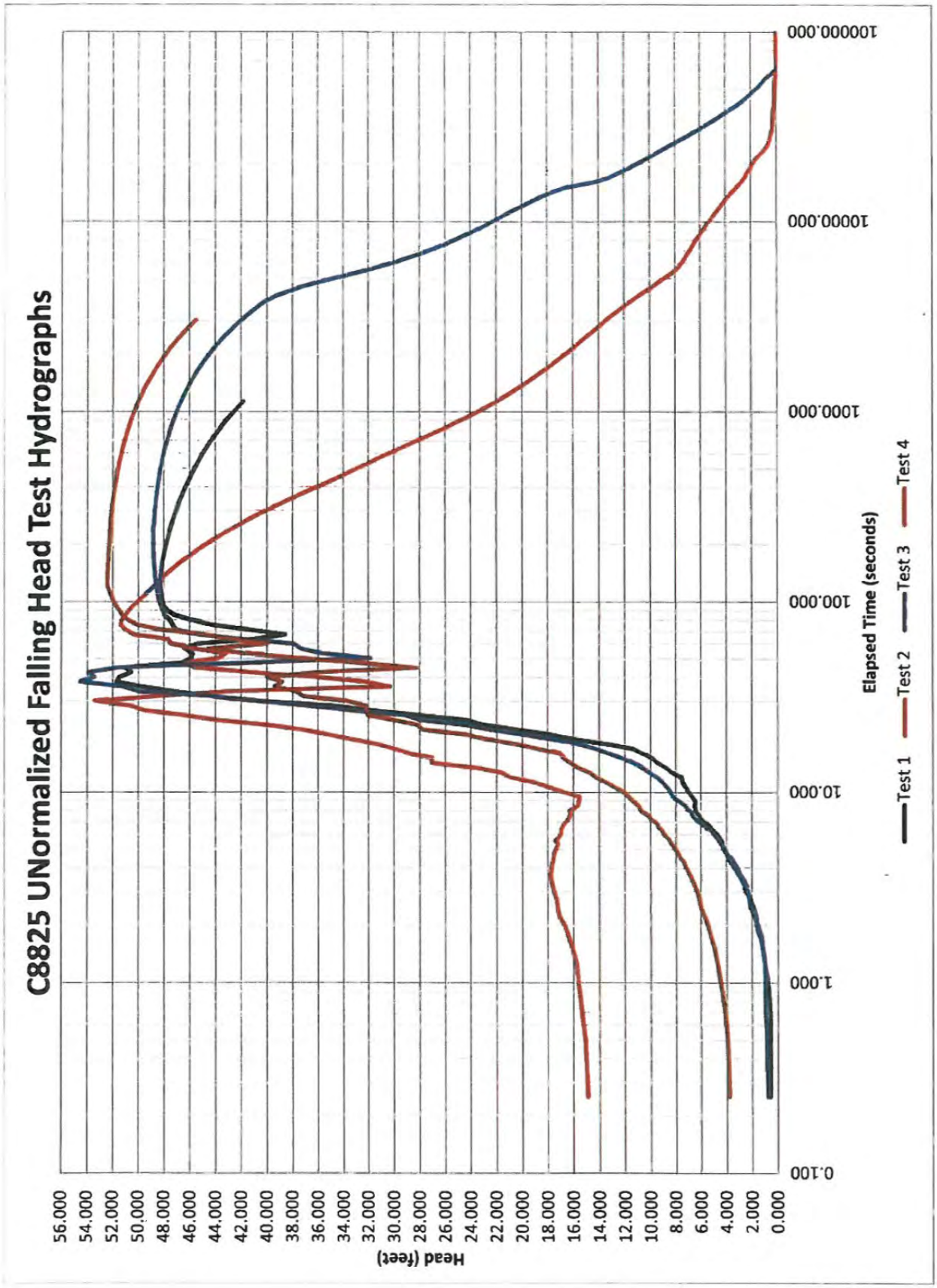
Hydrographs for well C8826

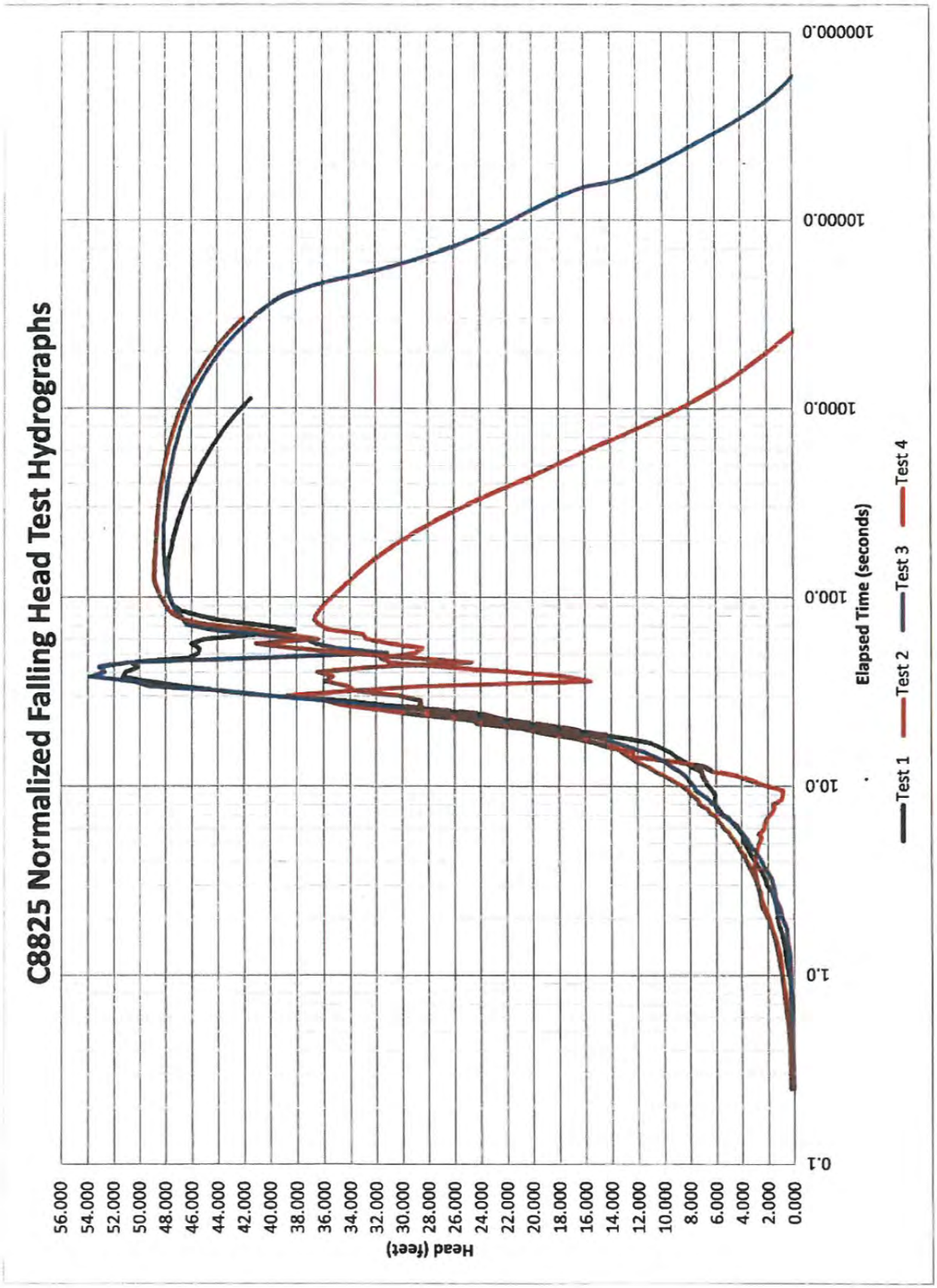

C8826 UNormalized Falling Head Test Hydrographs
Head (feet)
64.000
62.000
60.000
58.000
56.000
54.000
52.000
50.000
48.000
46.000
44.000
42.000
40.000
38.000
36.000
34.000
32.000
30.000
28.000
26.000
24.000
22.000
20.000
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
Elapsed Time (seconds)
0.100
1.000
10.000
100.000
1000.000
10000.000
Test 1 Level
Test 2 Level
Test 3 Level
Test 4 Level
Test 5 Level
Test 7 Level
Test 8 Level
Test 9 Level
Test 10 Level
Test 11 Level


C8826 Normalized Falling Head Test Hydrographs
Head (feet)
58.000
56.000
54.000
52.000
50.000
48.000
46.000
44.000
42.000
40.000
38.000
36.000
34.000
32.000
30.000
28.000
26.000
24.000
22.000
20.000
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
Elapsed Time (seconds)
0.1
1.0
10.0
100.0
1000.0
10000.0
Test 1
Test 2
Test 3
Test 4
Test 5
Test 7
Test 8
Test 9
Test 10
Test 11

Attachment 3

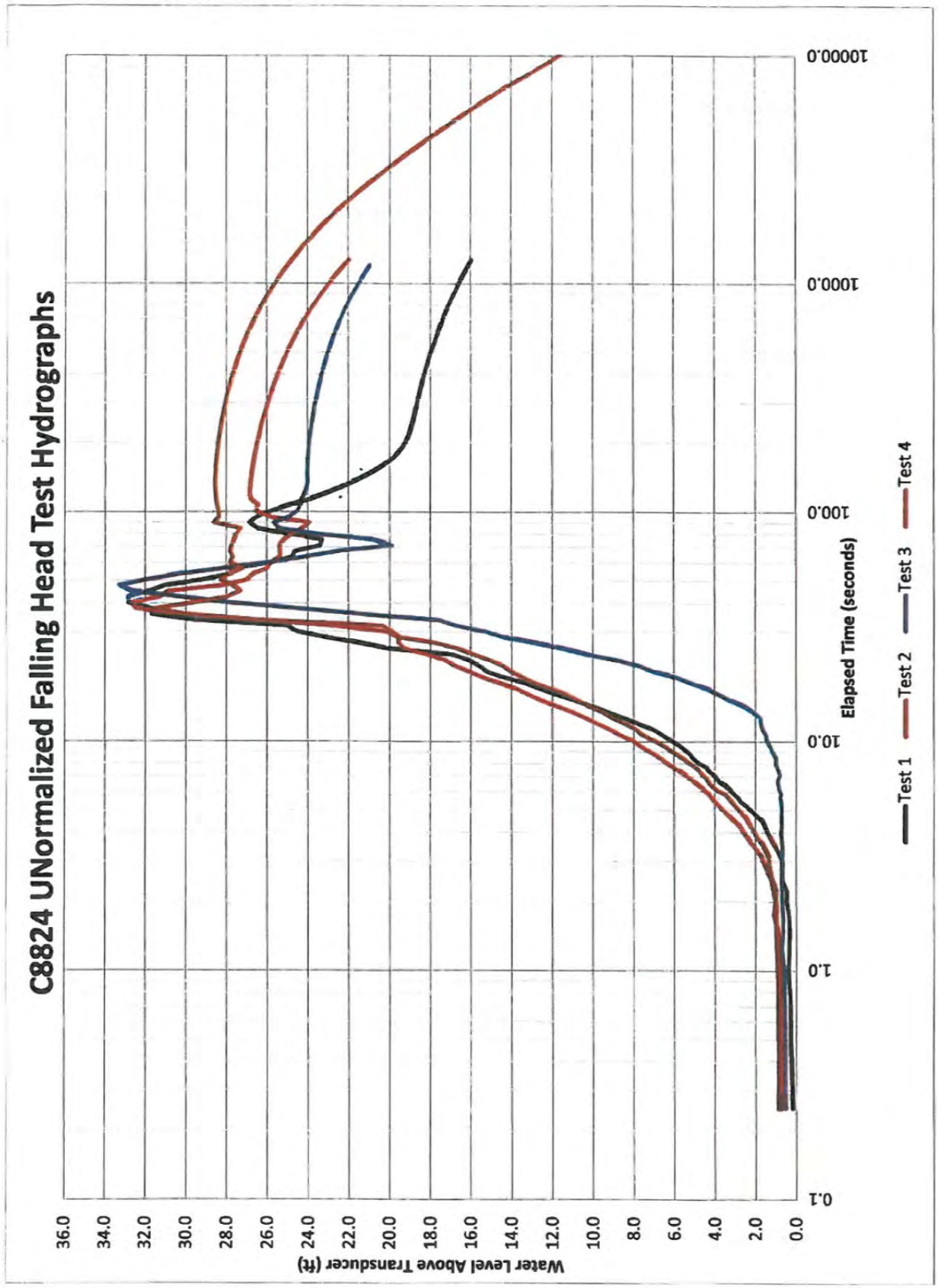
Hydrographs for well C8825

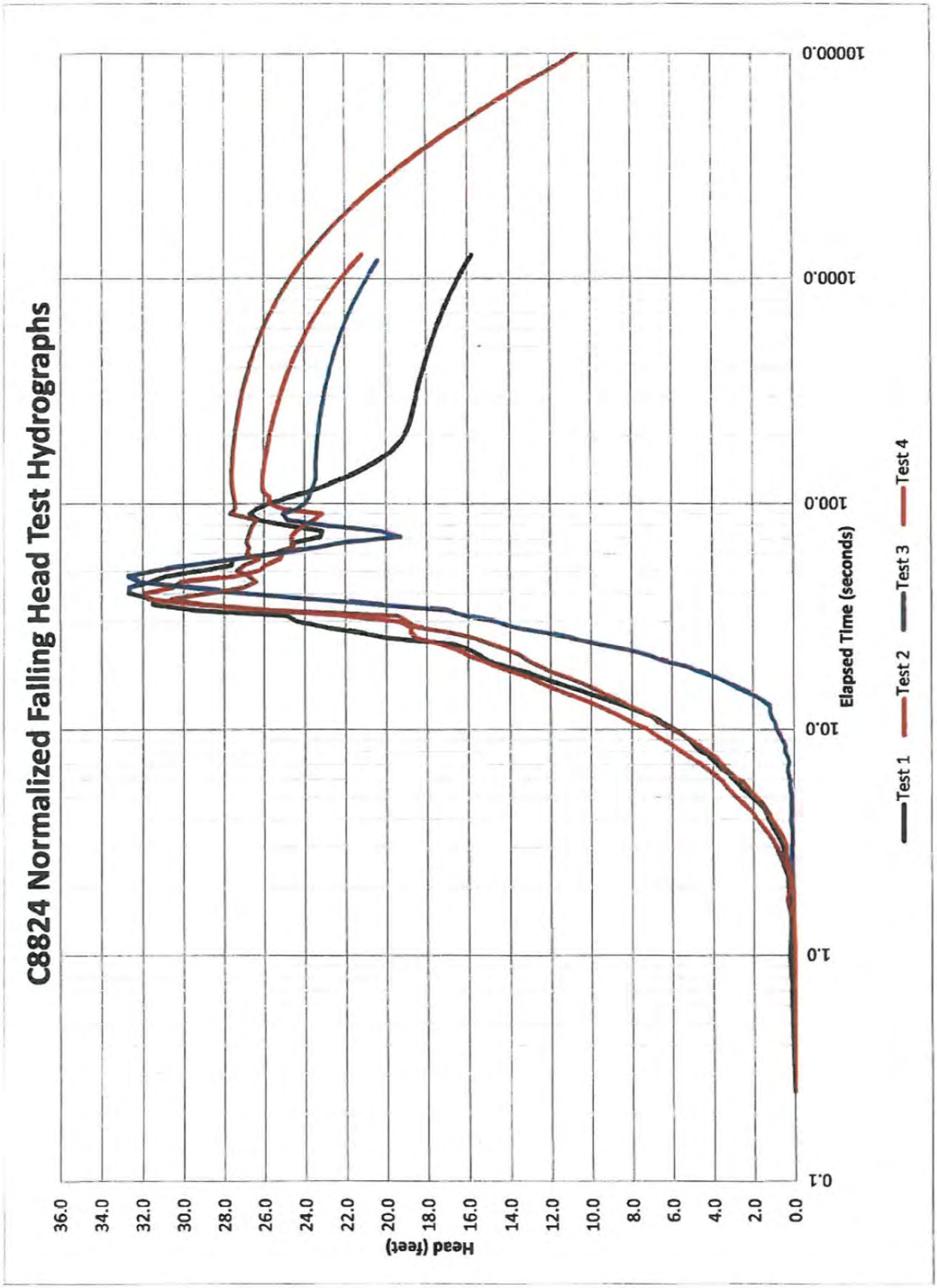

C8825 UNormalized Falling Head Test Hydrographs
Head (feet)
56.000
54.000
52.000
50.000
48.000
46.000
44.000
42.000
40.000
38.000
36.000
34.000
32.000
30.000
28.000
26.000
24.000
22.000
20.000
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
Elapsed Time (seconds)
0.100
1.000
10.000
100.000
1000.000
10000.000
100000.000
Test 1
Test 2
Test 3
Test 4


C8825 Normalized Falling Head Test Hydrographs
Head (feet)
56.000
54.000
52.000
50.000
48.000
46.000
44.000
42.000
40.000
38.000
36.000
34.000
32.000
30.000
28.000
26.000
24.000
22.000
20.000
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
0.1
1.0
10.0
100.0
1000.0
10000.0
100000.0
Elapsed Time (seconds)
Test 1
Test 2
Test 3
Test 4

Attachment 4

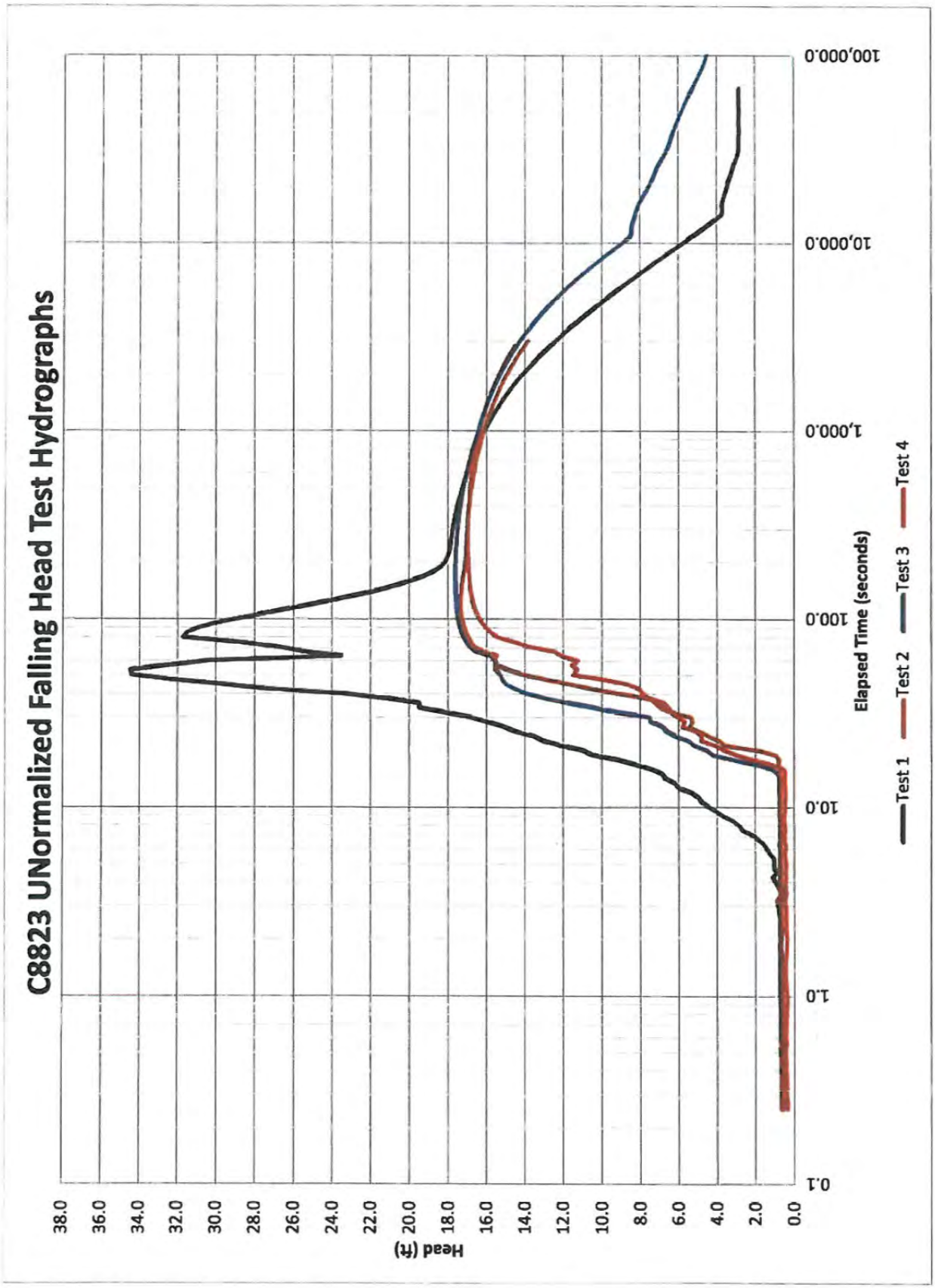
Hydrographs for well C8824

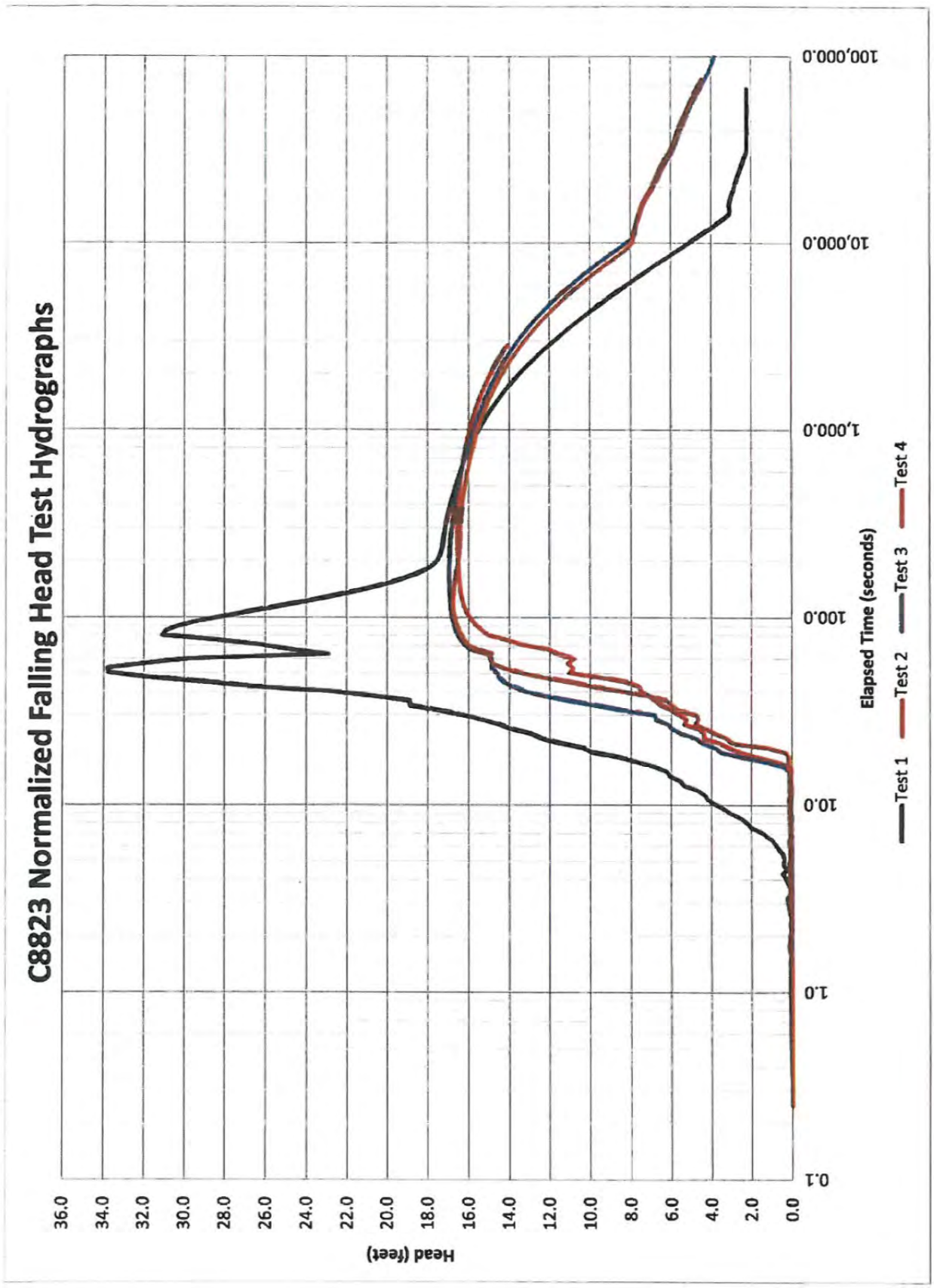

C8824 UNormalized Falling Head Test Hydrographs
Water Level Above Transducer (ft)
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Elapsed Time (seconds)
0.1
1.0
10.0
100.0
1000.0
10000.0
Test 1
Test 2
Test 3
Test 4


C8824 Normalized Falling Head Test Hydrographs
Head (feet)
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Elapsed Time (seconds)
0.1
1.0
10.0
100.0
1000.0
10000.0
Test 1
Test 2
Test 3
Test 4

Attachment 5

Hydrographs for well C8823


C8823 UNormalized Falling Head Test Hydrographs
Head (ft)
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Elapsed Time (seconds)
0.1
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
Test 1
Test 2
Test 3
Test 4


C8823 Normalized Falling Head Test Hydrographs
Head (feet)
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0.1
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
Elapsed Time (seconds)
Test 1
Test 2
Test 3
Test 4

This page intentionally left blank.

APPENDIX K

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY DOCUMENTS (ALL STAGES)

This page intentionally left blank.

STAGES I AND II

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY DOCUMENTS

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Intent to Construct a Soil Boring or Soil Sampling or Vapor Sampling Well

This form and required fees **MUST BE RECEIVED** by the Department of Ecology **72 HOURS BEFORE** you construct a well.

Notification Number

Submit one completed form for each job site and required fee (check or money order only) to: Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611

SE47030

NOTE: Please print. Processing your Notice of Intent may be delayed if all fields are not filled in completely.

1. Property Owner: U.S. Department Of Energy		Phone Number:	
Mailing Address: 825 Jadwin Avenue	City: Richland	State: WA	Zip Code: 99352
2. Agent (if different from above): Energy Solutions Inc.		Phone Number: (509) 727-4203	
Mailing Address: 2521 Stevens Dr.	City: Richland	State: WA	Zip Code: 99353

3. Well Location

Tax Parcel Number, Township, Range, Section, ¼, and ¼ ¼ are Required. Latitude and longitude (if available).

County Name: Benton - 3					
Well Site Street Address: Hanford Site 200W. Area			City:	State: WA	Zip Code:
Tax Parcel Number	Township: 12N	Range: 25E	Section: 12	¼ (within 160 acres): SE	¼ -¼ (within 40 acres): SW
Latitude Degrees	Latitude Time: min	sec		Horizontal Collection Method	
Longitude Degrees	Longitude Time: min	sec			

4. Well Construction Type: Soil Sampling — Project Name: SX Tank Farms

5. Estimated Start Date: 1/9/2013 12:00:00 AM

6. Professional's License Number

7. Well Drilling Company Name: ENERGY SOLUTIONS INC	Phone Number: 509-375-9800
8. Well Driller Name: LYLE AMOS	Driller License Number: 1224

9. **Send the entire form.**
Please copy the notification number (located in the upper and lower right corners) and keep in a safe place. Use this reference number when communicating with the Department of Ecology.

Total Number of wells to be constructed 6

This notification number must be provided to your driller:

SE47030

No fees are associated with this type of well construction.

mwwalkup@energysolutions.com

Your Notice of Intent has been processed as of 12/18/2012 This message being sent at (12/18/2012)

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE20137**

This form and required fees **MUST BE RECEIVED** by the Department of Ecology **72 HOURS BEFORE** you construct a well.

Submit one completed form for each job site and required fee (check or money order only) to:
Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611

NOTE: Please print. Processing your Notice of Intent may be delayed if all fields are not filled in completely.

1. Property Owner: U.S. Department Of Energy			Phone Number
Mailing Address: 825 Jadwin Avenue	City: Richland	State: WA	Zip Code: 99352
2. Agent (if different from above): Energy Solutions Inc.			Phone Number: (509) 727-4203
Mailing Address: 2521 Stevens Dr.	City: Richland	State: WA	Zip Code: 99353

3. Well Location

Tax Parcel Number, Township, Range, Section, ¼, and ¼ ¼ are Required. Latitude and longitude (if available).

County Name: Benton - 3					
Well Site Street Address: Hanford Site 200W. Area			City	State: WA	Zip Code
Tax Parcel Number	Township: 12N	Range: 25E	Section: 12	¼ (within 160 acres): SE	¼ -¼ (within 40 acres): SW
Latitude Degrees	Latitude Time: min	sec		Horizontal Collection Method	
Longitude Degrees	Longitude Time: min	sec			

4. Notice of Intent Number of well being decomissioned: SE47030
Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission: Geotech Soil Boring/Sampling Well - No Fee — How Many? 6

6. Estimated Decommission Start Date: 1/9/2013 12:00:0(— Project Name: SX Tank Farms

7. Professional's License Number

8. Well Drilling Company Name: ENERGY SOLUTIONS INC	Phone Number: 509-375-9800
9. Well Driller Name: LYLE AMOS	Driller License Number: 1224

10. **Send the entire form.**

Please copy the notification number (located in the upper and lower right corners) and keep in a safe place. Use this reference number when communicating with the Department of Ecology.

Water Well :	$50.00
Soil Sampling, Dewatering, Environmental investigation wells:	No Fee
All other wells:	$20.00 each
Amount Enclosed $	$0

This notification number must be provided to your driller:

AE20137

mwwalkup@energysolutions.com

Your Notice of Intent has been processed as of 12/18/2012 This message being sent at (12/18/2012)

ENERGYSOLUTIONS

January 21, 2013 FS-NW-LT-5610

Mr. Jeff Ayres
State of Washington
Department Of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Subject: Request for Variance to Washington Administrative Code 173-160-451 for Direct Push Resource Protection Wells

Dear Mr. Ayres,

Energy*Solutions* Government Group, Inc. (Energy*Solutions*), under contract to Washington River Protection Solutions (WRPS), will be using direct push technology for conducting vadose characterization and investigation in the vicinity of the 241-SX Tank Farms on the Hanford Site, Washington. These direct pushes are for the purpose of investigating the ability to extract pore water from target zones within the vadose zone for potential extraction of TC99 and reduce the moisture content of vadose sediments under and adjacent to SX Tank Farm. The information acquired from this direct push effort will be used to construct an extraction well and associated monitoring wells.

A Notice of Intent to Construct a Soil Boring or Soil Sampling or Vapor Sampling Well, No: SE47030, was submitted and processed on December 18, 2012 for conducting six direct pushes. The current schedule is to initiate the field activities by January 23, 2013. A total of three locations have been selected. A characterization and investigation push will be made at each location, for a total of six direct pushes. Geophysical logging will be conducted in each of the three investigation (logging) pushes. Soil samples will be collected for analysis at up to two selected horizons within the vadose zone in each of the three characterization pushes. At the completion of the investigation/ characterization activities, all six direct push probe holes will be decommissioned in accordance with the Washington Administrative Code (WAC) 173-160 requirements.

The target depth for these direct pushes is approximately 130+ ft bgs (below ground surface). A variance to the WAC 173-160-451 is being requested as these direct pushes will be greater than 30 ft in depth. In addition to the soil sampling and geophysical logging activities, several other actions will be performed within these pushes to gather information pertinent to the design of an extraction well and monitoring field. An approval/concurrence for the conduct of these actions is also requested. The sequence of activities to be conducted in support of this pore water extraction test is described below.

2345 Stevens Drive, Suite 240 • Richland, Washington 99354 • 509.371.8006
Fax: 509.375.9986 / 509.371.1906 / 509.375.9500 • www.energysolutions.com

During decommissioning of the investigation boreholes, up to two zones of interest will be tested in each of three locations through placement of a temporary screen and riser pipe, performance of a "falling head" permeability test, and well development surging.

After placement of the screen, the zone will be instrumented with a piezometer and one gallon of water will be introduced into the riser pipe. The decline of the head elevation will be monitored and recorded. When the decline has reached a steady state, the piezometer will be removed and the well will be surged to breakdown the borehole wall compaction to increase the permeability. After surging, the remaining water and debris (sediments) produced through the screen will be removed with a bailer. The piezometer will be replaced and another falling head test will be conducted. This iterative process will be repeated based on direction from the onsite hydrogeologist. At the conclusion of testing, the screen and riser will be removed and the remainder of the borehole will be decommissioned to meet WAC 173-160 requirements. Two to a maximum of six zones of interest will be tested.

Please provide your concurrence in the space provided below and return a copy for our project files. Please contact me at 375-9587 if you require additional information.

Sincerely,

Martin G. Gardner, Manager
Washington Operations

jmr

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
Jeffrey M. Ayres		Hydrogeologist	1/22/13

Comments:

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE20137

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction
☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:
SE47030

Consulting Firm EnergySolutions

Unique Ecology Well IDTag No. C8757A

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Amos, Lyle
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection
☒ Geotech Soil Boring

Property Owner U.S. Department of Energy
Site Address 825 Jadwin Avenue
City Richland County Benton
Location SE1/4-1/4 SW1/4 Sec 12 Twn 12N R 25E
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No.
Cased or Uncased Diameter 3.0 inchs Static Level N/A
Work/Decommission Start Date 01/23/2013
Work/Decommission Completed Date 01/23/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.5 inch O.D.) was driven to a depth of 11.5 ft. bgs. The drive point O.D. is ~3.0 inches. Refusal was reached and boring was decomissioned by filling with Bentonite (granular) while removing tubing. Material (bentonite) placed from 11.5 to surface.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with something hard like concrete at 11.5 feet. Could not drive past it.

SCALE: 1"= N/A PAGE 1 OF 1

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE20137

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction
☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:
SE47030

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8757B

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Amos, Lyle
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection
☒ Geotech Soil Boring

Property Owner U.S. Department of Energy
Site Address 825 Jadwin Avenue
City Richland County Benton
Location SE1/4-1/4 SW1/4 Sec 12 Twn 12N R 25E
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No. N/A
Cased or Uncased Diameter 3.0 inches Static Level N/A
Work/Decommission Start Date 01/24/2013
Work/Decommission Completed Date 01/24/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.5 inch O.D.) was driven to a depth of 11.5 ft. bgs. The drive point O.D. is ~3.0 inches. Refusal was reached and boring was decomissioned by filling with Bentonite (granular) while removing tubing. Material (bentonite) placed from 11.5 to surface.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with something hard like concrete at 11.5 feet. Could not drive past it.

SCALE: 1"= N/A PAGE 1 OF 1

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE20137

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

SE47030

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8757C

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Amos, Lyle

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection

☒ Geotech Soil Boring

Property Owner U.S. Department of Energy

Site Address 825 Jadwin Avenue

City Richland County Benton

Location SE1/4-1/4 SW1/4 Sec 12 Twn 12N R 25E

EWM ☒ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

Long Deg ____ Min ____ Sec ____

Tax Parcel No.N/A

Cased or Uncased Diameter 3.0 inches Static Level N/A

Work/Decommission Start Date 01/25/2013

Work/Decommission Completed Date 01/25/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.5 inch O.D.) was driven to a depth of 11.5 ft. bgs. The drive point O.D. is ~3.0 inches. Refusal was reached and boring was decomissioned by filling with Bentonite (granular) while removing tubing. Material (bentonite) placed from 11.5 to surface.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with something hard like concrete at 11.5 feet. Could not drive past it.

SCALE: 1"= N/A PAGE 1 OF 1

RPP-RPT-56849, Rev. 0

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE20137

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction
☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:
SE47030

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8759

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Amos, Lyle
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection
☒ Geotech Soil Boring

Property Owner U.S. Department of Energy
Site Address 825 Jadwin Avenue
City Richland County Benton
Location SE1/4-1/4 SW1/4 Sec 12 Twn 12N R 25E
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No. N/A
Cased or Uncased Diameter 3.0 inches Static Level N/A
Work/Decommission Start Date 03/11/2013
Work/Decommission Completed Date 03/11/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.5 inch O.D.) was driven to a depth of 152 ft. bgs. The drive point O.D. is ~3.0 inches. Refusal was reached and boring was decomissioned by filling with Bentonite (granular) while removing tubing. Material (bentonite) placed from 152.5 ft. bgs. to surface.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with and silt layers. Noted while driving

SCALE: 1"= N/A PAGE 1 OF 1

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE20137

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

SE47030

Consulting Firm EnergySolutions

Unique Ecology Well IDTag No. C8760

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Amos, Lyle

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection

☒ Geotech Soil Boring

Property Owner U.S. Department of Energy

Site Address 825 Jadwin Ave.

City Richland County Benton

Location NE1/4-1/4 SW1/4 Sec 28 Twn 14N R 26E

EWM ☒ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

Long Deg ____ Min ____ Sec ____

Tax Parcel No. N/A

Cased or Uncased Diameter 3.0 inch Static Level N/A

Work/Decommission Start Date 03/26/2013

Work/Decommission Completed Date 03/26/2013

Construction Design	Well Data	Formation Description
The direct push tubing (2.625 inch O.D.) was driven to a depth of 127.0 ft. bgs. The drive point O.D. is ~3.0 inches diameter. Samples were obtained at 121 to 123, 123 to 125, and 125 to 127 ft bgs. Reference Variance Request for Direct Push Bore-holes dated 03/30/2010.	O = bentonite crumbles S = sample intervals	100-N area, Hanford Site, Benton County Formation was sand and silt layers. Some gravel (noted during Driving)

SCALE: 1"= N/A PAGE 1 OF 1

ECY 050-12 (Rev. 7/06)

Ecology is an Equal Opportunity Employer

RPP-RPT-56849, Rev. 0

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE20137

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

SE47030

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8761

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Amos, Lyle

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection

☒ Geotech Soil Boring

Property Owner U.S. Department of Energy

Site Address 825 Jadwin Avenue

City Richland County Benton

Location SE1/4-1/4 SW1/4 Sec 12 Twn 12N R 25E

EWM ☒ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

Long Deg ____ Min ____ Sec ____

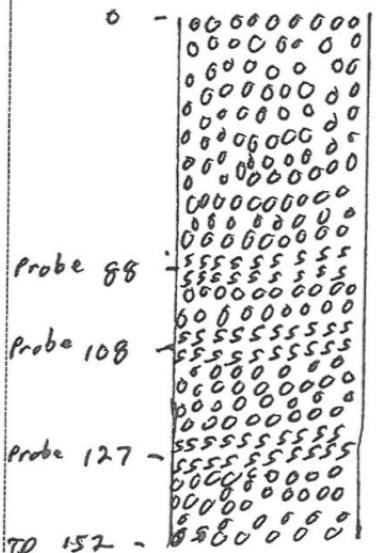
Tax Parcel No. N/A

Cased or Uncased Diameter 3.0 inches Static Level N/A

Work/Decommission Start Date 03/11/2013

Work/Decommission Completed Date 03/11/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.5 inch O.D.) was driven to a depth of 152 ft. bgs. The drive point O.D. is ~3.0 inches. Geophysical logging (Moisture and Gamma) was conducted to identify sample locations. The boring was decomissioned and 3 moisture probes were installed at 88, 108, and 127 ft. bgs. Reference Variance Request for Direct Push Bore-holes dated 03/30/2010	Surface protection and identification marker (boring number and date decommissioned) were set in place. o=Bentonite S= Sand/Diatomite	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with and silt layers. Noted while driving



SCALE: 1"= N/A PAGE 1 OF 1

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE20137

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

SE47030

Consulting Firm EnergySolutions

Unique Ecology Well IDTag No. C8762

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Amos, Lyle

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection

☒ Geotech Soil Boring

Property Owner U.S. Department of Energy

Site Address 825 Jadwin Ave.

City Richland County Benton

Location NE1/4-1/4 SW1/4 Sec 28 Twn 14N R 26E

EWM ☒ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

Long Deg ____ Min ____ Sec ____

Tax Parcel No.N/A

Cased or Uncased Diameter 3.0 inch Static Level N/A

Work/Decommission Start Date 03/19/2013

Work/Decommission Completed Date 03/19/2013

Construction Design	Well Data	Formation Description
The direct push tubing (2.625 inch O.D.) was driven to a depth of 129.0 ft. bgs. The drive point O.D. is ~3.0 inches diameter. Samples were obtained at 123 to 125, 125 to 127, and 127 to 129 ft bgs. Reference Variance Request for Direct Push Bore-holes dated 03/30/2010.	O = bentonite crumbles S = sample intervals	100-N area, Hanford Site, Benton County Formation was sand and silt layers. Some gravel (noted during Driving)

SCALE: 1"= N/A PAGE 1 OF 1

ECY 050-12 (Rev. 7/06)

Ecology is an Equal Opportunity Employer

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE21189

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

SE47759

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8763

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Amos, Lyle

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection

☒ Geotech Soil Boring

Property Owner U.S. Department of Energy

Site Address 825 Jadwin Avenue

City Richland County Benton

Location NE1/4-1/4 SE1/4 Sec 2 Twn 12N R 26E

EWM ☒ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Min _____ Sec _____

Long Deg _____ Min _____ Sec _____

Tax Parcel No.N/A

Cased or Uncased Diameter 3.0 inches Static Level N/A

Work/Decommission Start Date 05/01/2013

Work/Decommission Completed Date 05/02/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.5 inch O.D.) was driven to a depth of 221.0 ft. bgs. The drive point O.D. is ~3.0 inches. Geophysical logging (Moisture and Gamma) was conducted to identify sample locations. The boring was decomissioned and moisture probes were installed at 51, 71, 91, 111, 131 151 171, and 190.5 ft. bgs. Reference Variance Request for Direct Push Bore-holes dated 03/30/2010	Surface protection and identification marker (boring number and date decommissioned) were set in place. O=Bentonite S=Sand/Diatomite	Inside C Farm, 200 East Area, Hanford Site, Benton County Formation was sand with and silt layers. Noted while driving

SCALE: 1"= N/A PAGE 1 OF 1

STAGE III

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY DOCUMENTS

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Intent to Construct a Soil Boring or Soil Sampling or Vapor Sampling Well

This form and required fees **MUST BE RECEIVED** by the Department of Ecology **72 HOURS BEFORE** you construct a well.

Notification Number SE48334

Submit one completed form for each job site and required fee (check or money order only) to: Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611

NOTE: Please print. Processing your Notice of Intent may be delayed if all fields are not filled in completely.

1. Property Owner: U.S. Department Of Energy			Phone Number:
Mailing Address: 825 Jadwin Avenue	City: Richland	State: WA	Zip Code: 99352
2. Agent (if different from above): Energy Solutions Inc.			Phone Number: (509) 375-9800
Mailing Address: 2521 Stevens Dr.	City: Richland	State: WA	Zip Code: 99353

3. Well Location

Tax Parcel Number, Township, Range, Section, ¼, and ¼ ¼ are Required. Latitude and longitude (if available).

County Name: Benton - 3					
Well Site Street Address: Hanford Site 200W. Area			City:	State: WA	Zip Code:
Tax Parcel Number	Township: 12N	Range: 25E	Section: 12	¼ (within 160 acres): SW	¼ -¼ (within 40 acres): SE
Latitude Degrees	Latitude Time: min	sec		Horizontal Collection Method	
Longitude Degrees	Longitude Time: min	sec			

4. Well Construction Type: Geotechnical Soil Boring — Project Name: SX Stage III

5. Estimated Start Date: 6/6/2013 12:00:00 AM

6. Professional's License Number

7. Well Drilling Company Name	Phone Number: None Supplied
8. Well Driller Name: LYLE AMOS	Driller License Number: 1224

9. **Send the entire form.**
Please copy the notification number (located in the upper and lower right corners) and keep in a safe place. Use this reference number when communicating with the Department of Ecology.

Total Number of wells to be constructed 4

This notification number must be provided to your driller: SE48334

No fees are associated with this type of well construction.

mwwalkup@energysolutions.com

Your Notice of Intent has been processed as of 6/3/2013 This message being sent at (6/3/2013)

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Intent to Decommission a Well

Notification Number AE22134

This form and required fees **MUST BE RECEIVED** by the Department of Ecology **72 HOURS BEFORE** you construct a well.

Submit one completed form for each job site and required fee (check or money order only) to:
Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611

NOTE: Please print. Processing your Notice of Intent may be delayed if all fields are not filled in completely.

1. Property Owner: U.S. Department Of Energy			Phone Number
Mailing Address: 825 Jadwin Avenue	City: Richland	State: WA	Zip Code: 99352
2. Agent (if different from above): Energy Solutions Inc.			Phone Number: (509) 375-9800
Mailing Address: 2521 Stevens Dr.	City: Richland	State: WA	Zip Code: 99353

3. Well Location

Tax Parcel Number, Township, Range, Section, ¼, and ¼ ¼ are Required. Latitude and longitude (if available).

County Name: Benton - 3					
Well Site Street Address: Hanford Site 200W. Area			City	State: WA	Zip Code
Tax Parcel Number	Township: 12N	Range: 25E	Section: 12	¼ (within 160 acres): SW	¼ -¼ (within 40 acres): SE
Latitude Degrees	Latitude Time: min	sec	Horizontal Collection Method		
Longitude Degrees	Longitude Time: min	sec			

4. Notice of Intent Number of well being decomissioned: SE48334
Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission: Geotech Soil Boring/Sampling Well - No Fee
How Many? 4

6. Estimated Decommission Start Date: 6/6/2013 12:00:0(
Project Name: SX Stage III

7. Professional's License Number

8. Well Drilling Company Name	Phone Number: None Supplied
9. Well Driller Name: LYLE AMOS	Driller License Number: 1224

10. **Send the entire form.**

Please copy the notification number (located in the upper and lower right corners) and keep in a safe place. Use this reference number when communicating with the Department of Ecology.

Water Well :	$50.00
Soil Sampling, Dewatering, Environmental investigation wells:	No Fee
All other wells:	$20.00 each
Amount Enclosed $	$0

This notification number must be provided to your driller:

AE22134

mwwalkup@energysolutions.com

Your Notice of Intent has been processed as of 6/3/2013 This message being sent at (6/3/2013)

ENERGYSOLUTIONS

June 6, 2013 FS-NW-LT-5637

Mr. Jeff Ayres
State of Washington
Department Of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Subject: Request for Variance to WAC 173-160-451 for Direct Push Resource Protection Wells for SX Tank Farm

Dear Mr. Ayres,

Energy*Solutions* Government Group, Inc. (Energy*Solutions*), under contract to Washington River Protection Solutions (WRPS), will be using direct push technology for conducting pore water extraction technology testing in the vicinity of the 241-SX Tank Farms on the Hanford Site, Washington. These direct pushes are for the purpose of demonstrating the ability to extract pore water from target zones within the Vadose zone for potential extraction of TC99 and reduce the moisture content of vadose sediments under and adjacent to SX Tank Farm. The information acquired from these temporary constructions is intended to provide information to evaluate the pore water extraction potential for use as a method to reduce contaminate inventory in sub-surface sediments.

A Notice of Intent to Construct a Soil Boring or Soil Sampling or Vapor Sampling Well, No.: SE48334, has been prepared for conducting four direct pushes. The current schedule is to initiate the field activities by June 10, 2013. A total of four locations have been selected. A single direct push casing will be driven at each of the four locations, for a total of four direct pushes. Geophysical logging will be conducted in each of the pushes. At the completion of the logging activities, temporary screen, packer, and sump assemblies will be placed into each hole and, after well permeability activities, pore water extraction testing will be conducted. At the conclusion of the testing phase the direct push probe holes will be decommissioned in accordance with the Washington Administrative Code (WAC) 173-160 requirements.

The targeted total depth for these direct pushes is approximately 150+ ft bgs (below ground surface). A variance to the WAC 173-160-451 is being requested as these direct pushes will be greater than 30 ft in depth. In addition to the geophysical logging activities, several other actions will be performed within these pushes to:

2345 Stevens Drive, Suite 240 • Richland, Washington 99354 • 509.371.8006
Fax: 509.375.9986 / 509.371.1906 / 509.375.9500 • www.energysolutions.com

1) Place temporary screen and packer assemblies in the wells; 2) Through surging and conducting falling head data collection actions, improve and quantify the effective permeability of the screen interval; 3) Conduct a two to three month long pore water extraction testing activity; and 4) Decommission the borings at the conclusion of the extraction testing.

The sump assemblies will be cemented in place, the packers above the screen will be inflated, and the screen /sump will be instrumented with a piezometer. Potable water will be introduced into the well screen and the decline of the head elevation will be monitored and recorded. When the decline has reached a steady state, the piezometer will be removed and the well will be surged to breakdown the borehole wall compaction to increase the permeability. After surging, the remaining water and debris (sediments) produced through the screen will be removed with a bailer. The piezometer will be replaced and another falling head test will be conducted. This iterative process will be repeated based on direction from the onsite hydrogeologist. At the conclusion of the development process, pore water extraction testing will be conducted. At the conclusion of testing, as much of the riser and screen assembly as possible will be removed, the remaining tubing, screen assembly, etc., will be filled with bentonite as the outer casing is extracted in compliance with WAC 173-160 requirements for decommissioning.

Please provide your concurrence in the space provided below and return a copy for our project files.

If you have any questions, or require any additional information, please contact me at (509) 375-9587.

Sincerely,

Martin G. Gardner, Manager
Washington Operations

jmr

Energy*Solutions* – MGG File/LB

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
Jeff Ayres		Hydrogeologist	6/6/13
NINA M. MENARD for Cheryl Whalen	Nina M. Menard	Acting Section Manager	6/6/13

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. SE48334

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction
☐ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:
SE48334

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8823

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Amos, Lyle
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

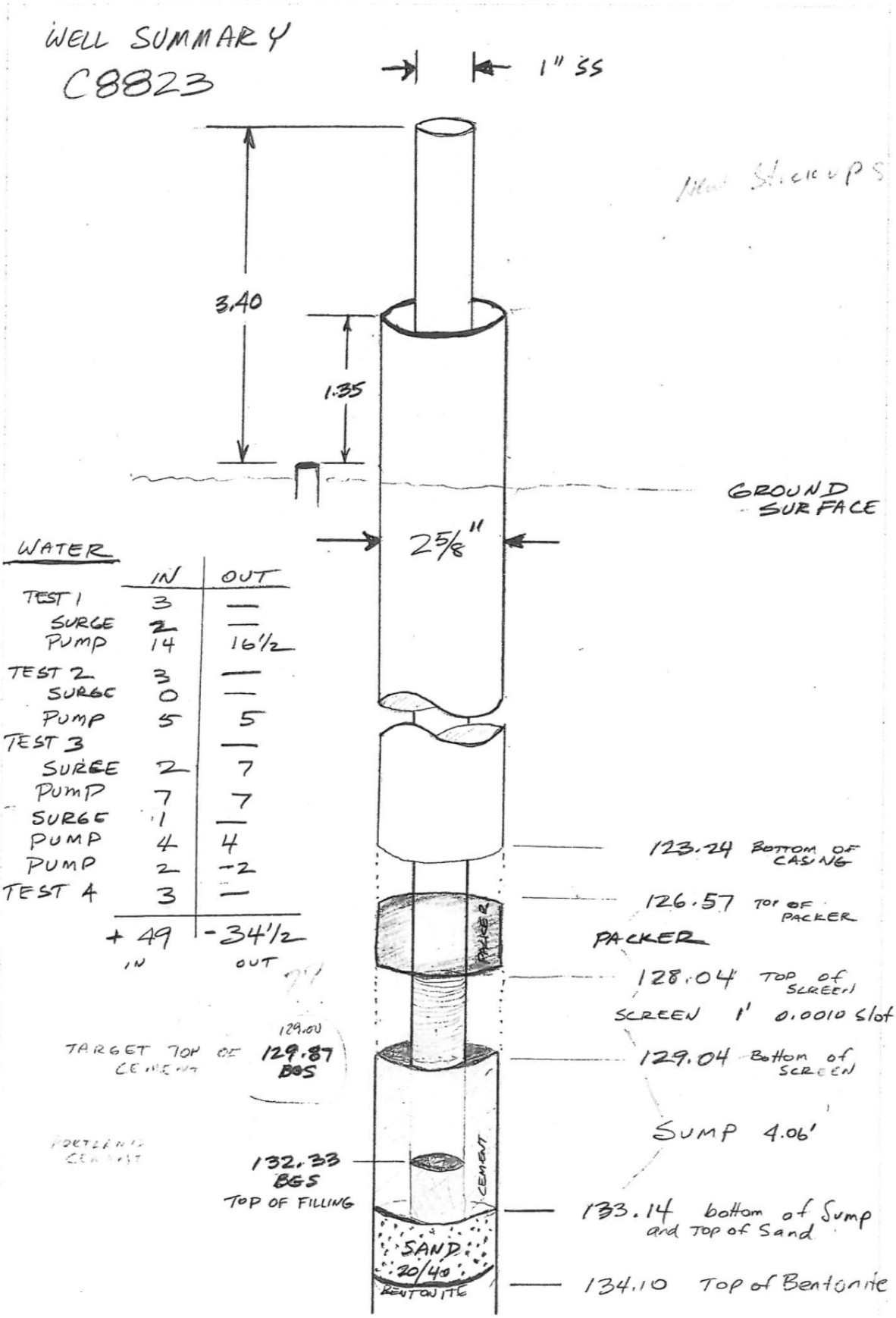
Type of Well *("x in box)*
☐ Resource Protection
☒ Geotech Soil Boring

Property Owner U.S. Department of Energy
Site Address 825 Jadwin Avenue
City Richland County Benton
Location SW1/4-1/4 SE1/4 Sec 12 Twn 12N R 25E
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No. N/A
Cased or Uncased Diameter 3.0 inches Static Level N/A

Work/Decommission Start Date 08/13/2013
Work/Decommission Completed Date 08/14/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.625 inch O.D.) was driven to a depth of 153 ft. bgs. The drive point O.D. is ~3.0 inches. The boring was backfilled to 134.10 with bentonite. A temporary 1 inch well and screen was installed (see attached asbuilt). Referance Variance Request for Direct Push Resource Protection Wells for SX Tank Farm dated June 6, 2013.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with and silt layers. Noted while driving

SCALE: 1"= N/A PAGE 1 OF 2


WELL SUMMARY
C8823
1" SS
New Stickups
3.40
1.35
GROUND SURFACE
2 5/8"
WATER
IN OUT
TEST 1 3 —
SURGE 2 —
PUMP 14 16 1/2
TEST 2 3 —
SURGE 0 —
PUMP 5 5
TEST 3 —
SUREE 2 7
PUMP 7 7
SURGE 1 —
PUMP 4 4
PUMP 2 -2
TEST 4 3 —
+ 49 IN - 34 1/2 OUT
123.24 BOTTOM OF CASING
126.57 TOP OF PACKER
PACKER
128.04 TOP of SCREEN
SCREEN 1' 0.0010 slot
129.04 Bottom of SCREEN
SUMP 4.06'
133.14 bottom of Sump and Top of Sand
134.10 Top of Bentonite
TARGET TOP OF CEMENT
129.87 BGS
132.33 BGS TOP OF FILLING
CEMENT
SAND 20/40
BENTONITE

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. SE48334

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction
☐ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:
SE48334

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8824

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Amos, Lyle
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 1224

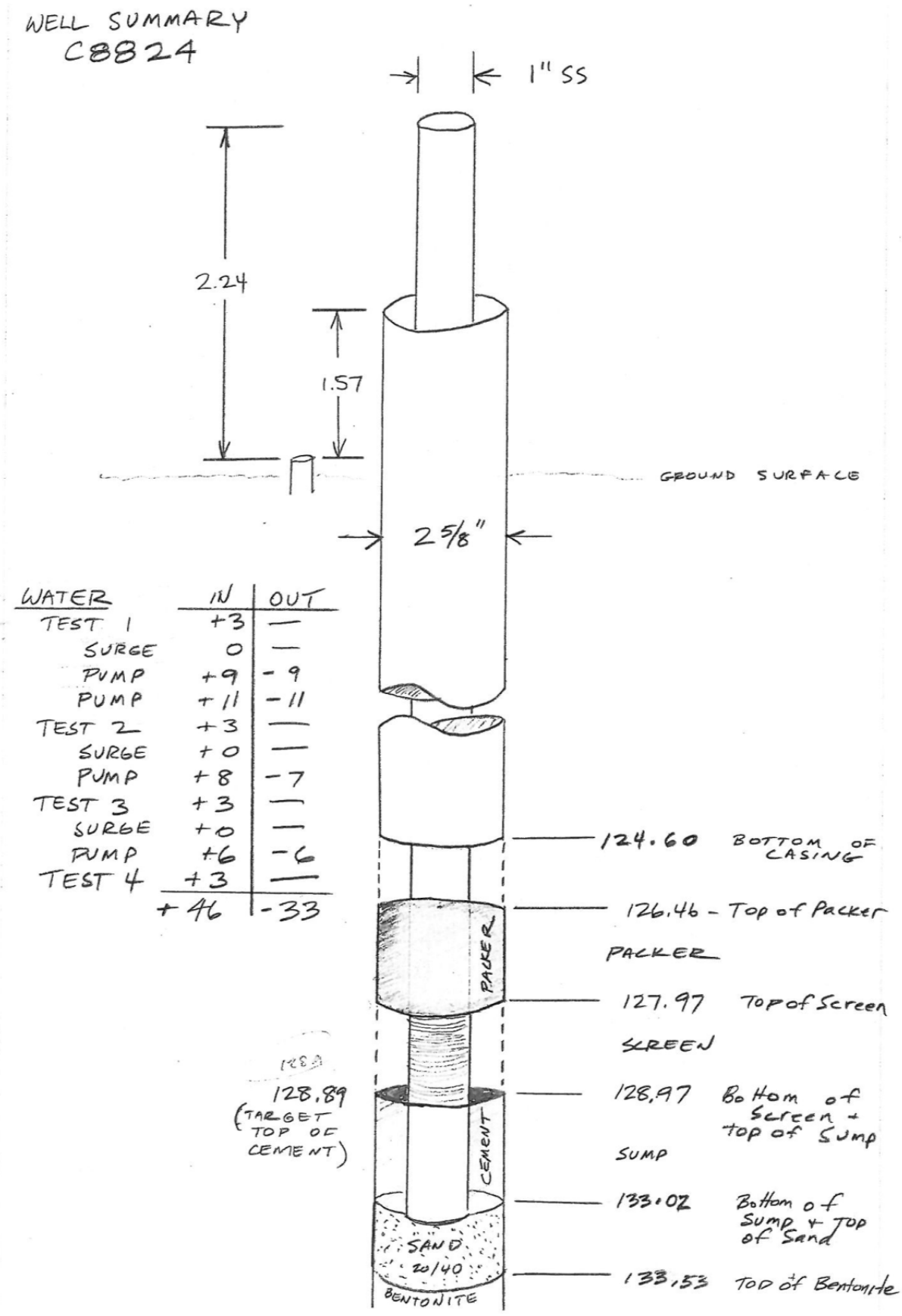
If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*
☐ Resource Protection
☒ Geotech Soil Boring

Property Owner U.S. Department of Energy
Site Address 825 Jadwin Avenue
City Richland County Benton
Location SW1/4-1/4 SE1/4 Sec 12 Twn 12N R 25E
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No. N/A
Cased or Uncased Diameter 3.0 inches Static Level N/A
Work/Decommission Start Date 08/01/2013
Work/Decommission Completed Date 08/07/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.625 inch O.D.) was driven to a depth of 153 ft. bgs. The drive point O.D. is ~3.0 inches. The boring was backfilled to 133.53 with bentonite. A temporary 1 inch well and screen was installed (see attached asbuilt). Referance Variance Request for Direct Push Resource Protection Wells for SX Tank Farm dated June 6, 2013.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with and silt layers. Noted while driving

SCALE: 1"= N/A PAGE 1 OF 2


WELL SUMMARY
C8824
1" SS
2.24
1.57
GROUND SURFACE
2 5/8"
WATER | IN | OUT
TEST 1 | +3 | —
SURGE | 0 | —
PUMP | +9 | -9
PUMP | +11 | -11
TEST 2 | +3 | —
SURGE | +0 | —
PUMP | +8 | -7
TEST 3 | +3 | —
SURGE | +0 | —
PUMP | +6 | -6
TEST 4 | +3 | —
+46 | -33
124.60 BOTTOM OF CASING
126.46 - Top of Packer
PACKER
PACKER
127.97 Top of Screen
SCREEN
128.89 (TARGET TOP OF CEMENT)
128.97 Bottom of Screen + Top of Sump
SUMP
CEMENT
133.02 Bottom of Sump + Top of Sand
SAND 20/40
133.53 Top of Bentonite
BENTONITE

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. SE48334

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction
☐ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:
SE48334

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8825

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Amos, Lyle
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

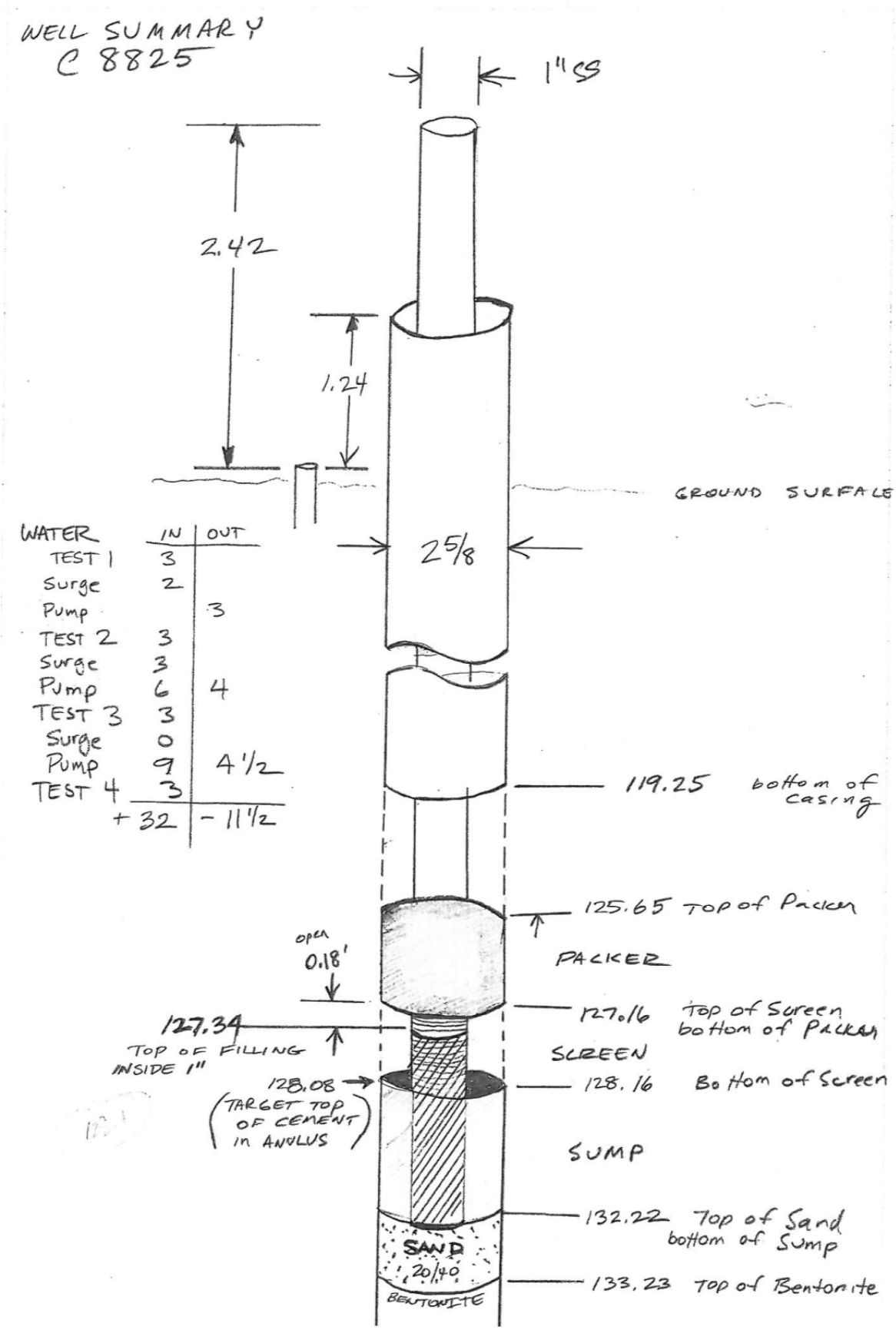
Type of Well *("x in box)*
☐ Resource Protection
☒ Geotech Soil Boring

Property Owner U.S. Department of Energy
Site Address 825 Jadwin Avenue
City Richland County Benton
Location SW1/4-1/4 SE1/4 Sec 12 Twn 12N R 25E
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No. N/A
Cased or Uncased Diameter 3.0 inches Static Level N/A

Work/Decommission Start Date 08/08/2013
Work/Decommission Completed Date 08/09/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.625 inch O.D.) was driven to a depth of 153 ft. bgs. The drive point O.D. is ~3.0 inches. The boring was backfilled to 133.23 with bentonite. A temporary 1 inch well and screen was installed (see attached asbuilt). Referance Variance Request for Direct Push Resource Protection Wells for SX Tank Farm dated June 6, 2013.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with and silt layers. Noted while driving

SCALE: 1"= N/A PAGE 1 OF 2


WELL SUMMARY
C 8825
1" SS
2.42
1.24
GROUND SURFACE
2 5/8
WATER IN OUT
TEST 1 3
Surge 2
Pump 3
TEST 2 3
Surge 3
Pump 6 4
TEST 3 3
Surge 0
Pump 9 4 1/2
TEST 4 3
+ 32 - 11 1/2
119.25 bottom of casing
125.65 Top of Packer
PACKER
open 0.18'
127.34 TOP OF FILLING INSIDE 1"
127.16 Top of Screen bottom of Packer
SCREEN
128.08 (TARGET TOP OF CEMENT IN ANULUS)
128.16 Bottom of Screen
SUMP
132.22 Top of Sand bottom of Sump
SAND 20/40
133.23 Top of Bentonite
BENTONITE

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. SE48334

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction
☐ Decommission

ORIGINAL INSTALLATION Notice of Intent Number: SE48334

Consulting Firm EnerySolutions

Unique Ecology Well IDTag No. C8826

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Amos, Lyle
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 1224

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☐ Resource Protection
☒ Geotech Soil Boring

Property Owner U.S. Department of Energy

Site Address 825 Jadwin Avenue

City Richland County Benton

Location SW1/4-1/4 SE1/4 Sec 12 Twn 12N R 25E

EWM ☒ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____

Tax Parcel No. N/A

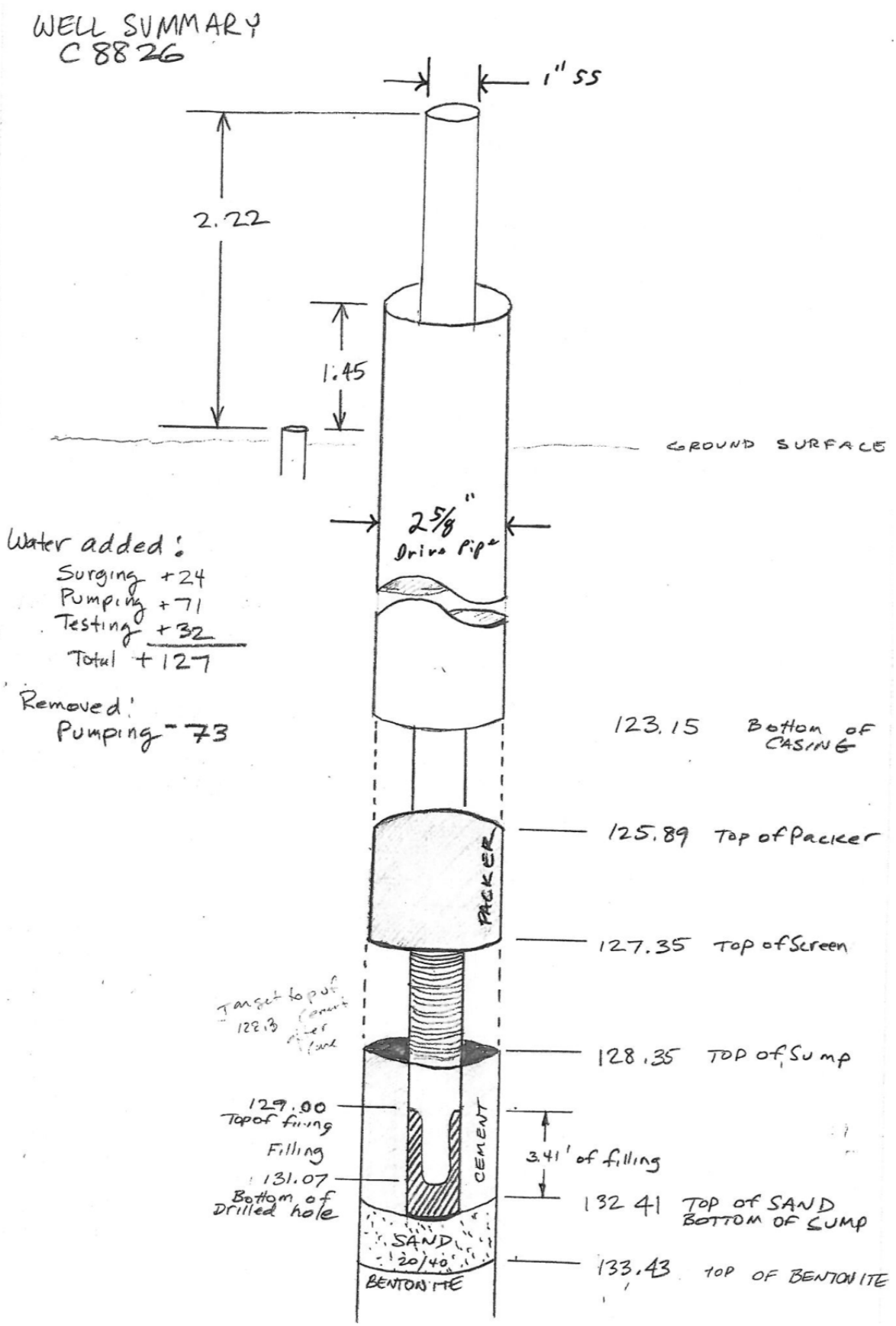
Cased or Uncased Diameter 3.0 inches Static Level N/A

Work/Decommission Start Date 08/1/2013

Work/Decommission Completed Date 08/13/2013

Construction Design	Well Data	Formation Description
The direct push tubing(2.625 inch O.D.) was driven to a depth of 153 ft. bgs. The drive point O.D. is ~3.0 inches. The boring was backfilled to 133.43 with bentonite. A temporary 1 inch well and screen was installed (see attached asbuilt). Referance Variance Request for Direct Push Resource Protection Wells for SX Tank Farm dated June 6, 2013.	N/A	By Sx Tank Farm, 200 West Area, Hanford Site, Benton County Formation was sand with and silt layers. Noted while driving

SCALE: 1"= N/A PAGE 1 OF 2


WELL SUMMARY
C 8826
1" SS
2.22
1.45
GROUND SURFACE
2 5/8" Drive Pipe
Water added:
Surging +24
Pumping +71
Testing +32
Total +127
Removed:
Pumping -73
123.15 Bottom of CASING
125.89 Top of Packer
PACKER
127.35 Top of Screen
Target to put cement after pump
128.13
128.35 TOP of Sump
129.00 Top of filling
Filling
131.07 Bottom of Drilled hole
CEMENT
3.41' of filling
132.41 TOP of SAND BOTTOM OF SUMP
SAND
20/40
133.43 TOP OF BENTONITE
BENTONITE

APPENDIX L

POSITIONING SYSTEM COORDINATES AND MAPS (ALL STAGES)

This page intentionally left blank.

SURVEY REPORT

STAGES I AND II

SURVEY DATA FORM

Title/Affected Tank Farms: GPS Survey South of SX Tank Farm

Dome Elevation ☐ Civil ☒ Subsurface Investigations ☐

1. Project Number: **2. Job Number:**

David P. Baalman, PLS — April 12, 2013

3. Prepared By: (Print) (Sign) (Date)

4. Requisition Number:

5. Subcontract-Release Number: BMA 49896-23 Amendment 1 **6. Number of Pages or Images:**

7. Sub Contract Release Number: BMA 49896-23 Amendment 1

Gary Wagner, PLS — April 12, 2013

8. Reviewer: (Print) (Sign) (Date)

9. Document/Project Title:
GPS Survey South of SX Tank Farm

10. Change Description:

11. Change Justification:

RECORDING DATA:

12. What is the Purpose of the Survey?
Provide Washington State Plane Coordinate positions for drill hole locations near SX Farm

13. Attached files (copy of civil survey field log book notes, electronic survey data print outs, GPR ground scan data, coordinate tables, drawings)
Survey Sketch and Excel Spreadsheet with State Plane locations

14. Electronic files downloaded (copy of civil survey field log book .pdf, electronic survey data .csv, GPR ground scan data .dwg, coordinate tables .xls, drawings .dwg)

15. Control Monument References:
F-322 (NGS Monument), GPS-14 (monument from Hanford 200 area GPS Network - Hanford site wide mapping project

16. Benchmark References:
Same as above

17. Identification Number(s) of Equipment Used:
Trimble R8-3 (SN 4934400694)

18. Survey Dates: 4-11-13

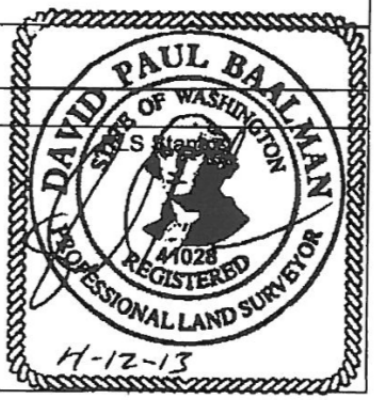
19. Names of Personnel Performing the Work:
David P. Baalman, PLS & Michael F. Harrington, LSIT

20. Weather Conditions: Overcast, wind 10-15

21. Calibration and Functional Check Information:
N/A

22. Horizontal and Vertical Survey Datum: NAD83/91 (Horizontal) NAVD88 (Vertical)

SURVEY RESULTS AND COMMENTS:



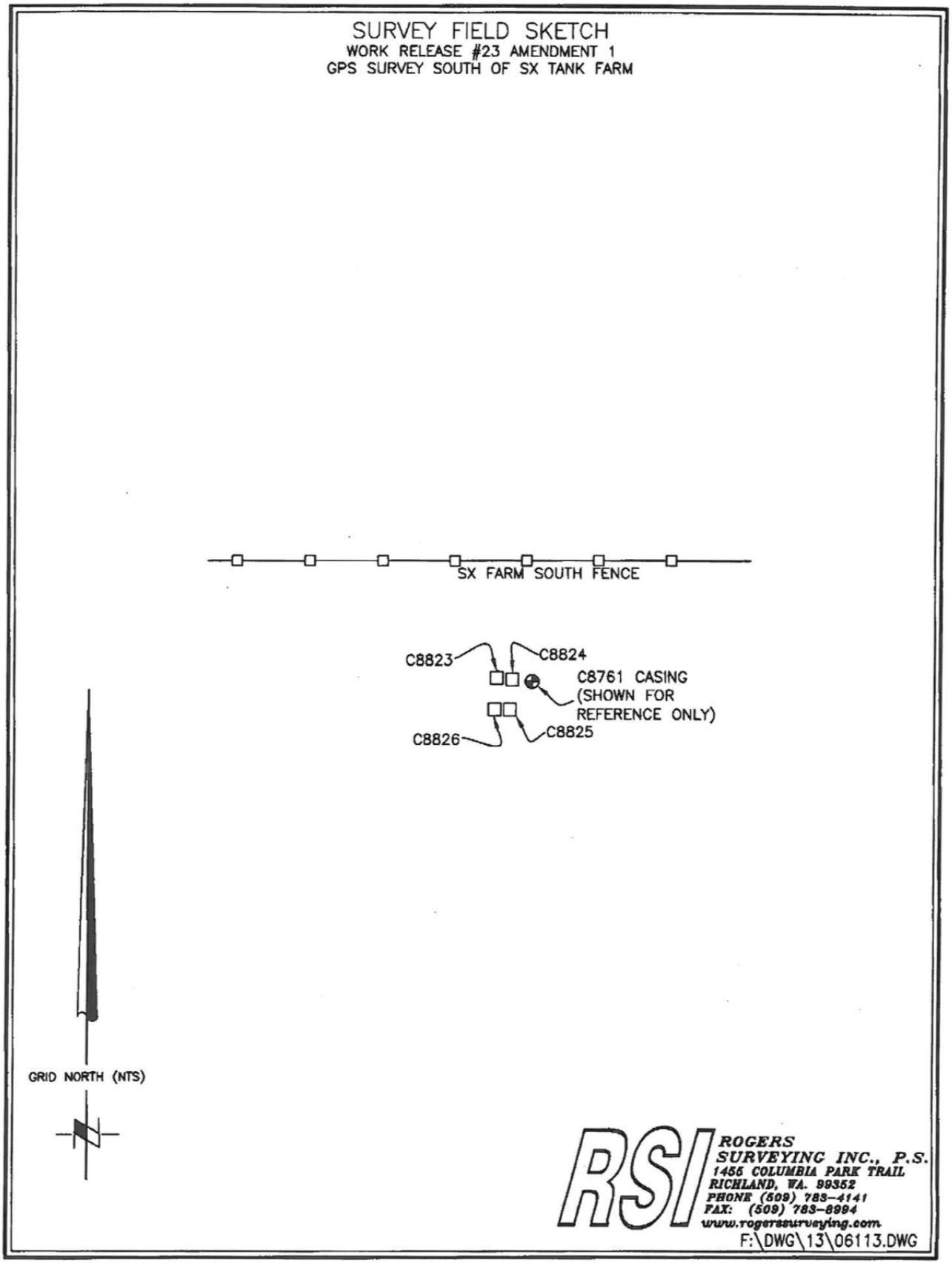
Page 1 of 1

A-6005-997 (REV 1)

GPS SURVEY "SOUTH OF SX TANK FARM"
FIELD SURVEY REPORT

	NAD83/91 COORDINATES (meters)			
POINT #	NORTHING (Y)	EASTING (X)	ELEVATION (Z)	DESCRIPTION
2842	134133.30	566824.06	199.56	C8823 (Wood stake at proposed future soil boring point)
2843	134133.16	566825.33	199.58	C8824 (Wood stake at proposed future soil boring point)
2844	134130.76	566825.13	199.48	C8825 (Wood stake at proposed future soil boring point)
2845	134130.78	566823.90	199.44	C8826 (Wood stake at proposed future soil boring point)

BNL TECH
ROGERS SURVEYING, INC., P.S. RICHLAND, WA
SUBCONTRACT 2012-011 WORK RELEASE 23
MARCH 2013


SURVEY FIELD SKETCH
WORK RELEASE #23 AMENDMENT 1
GPS SURVEY SOUTH OF SX TANK FARM
SX FARM SOUTH FENCE
C8823
C8824
C8761 CASING
(SHOWN FOR
REFERENCE ONLY)
C8826
C8825
GRID NORTH (NTS)
RSI
ROGERS
SURVEYING INC., P.S.
1455 COLUMBIA PARK TRAIL
RICHLAND, WA. 99352
PHONE (509) 783-4141
FAX: (509) 783-8994
www.rogerssurveying.com
F:\DWG\13\06113.DWG

SURVEY REPORT

STAGE III

SURVEY DATA FORM

Title/Affected Tank Farms: GPS Survey South of SX Tank Farm

Dome Elevation ☐ Civil ☒ Subsurface Investigations ☐

1. **Project Number:** 2. **Job Number:**

David P. Baalman, PLS — April 2, 2013

3. **Prepared By:** (Print) (Sign) (Date)

4. **Requisition Number:**

5. **Subcontract-Release Number:** BMA 49896-23 6. **Number of Pages or Images:**

7. **Sub Contract Release Number:** BMA 49896-23

Gary Wagner, PLS — April 2, 2013

8. **Reviewer:** (Print) (Sign) (Date)

9. **Document/Project Title:**
GPS Survey South of SX Tank Farm

10. **Change Description:**

11. **Change Justification:**

RECORDING DATA:

12. **What is the Purpose of the Survey?**
Provide Washington State Plane Coordinate positions for drill hole locations near SX Farm

13. **Attached files** (copy of civil survey field log book notes, electronic survey data print outs, GPR ground scan data, coordinate tables, drawings)
Survey Sketch and Excel Spreadsheet with State Plane locations

14. **Electronic files downloaded** (copy of civil survey field log book .pdf, electronic survey data .csv, GPR ground scan data .dwg, coordinate tables .xls, drawings .dwg)

15. **Control Monument References:**
F-322 (NGS Monument), GPS-14 (monument from Hanford 200 area GPS Network - Hanford site wide mapping project

16. **Benchmark References:**
Same as above

17. **Identification Number(s) of Equipment Used:**
Trimble R8-3 (SN 4934400684)

18. **Survey Dates:** 3/27/13 & 3/28/13

19. **Names of Personnel Performing the Work:**
David P. Baalman, PLS & Michael F. Harrington, LSIT

20. **Weather Conditions:** Clear, sunny & calm

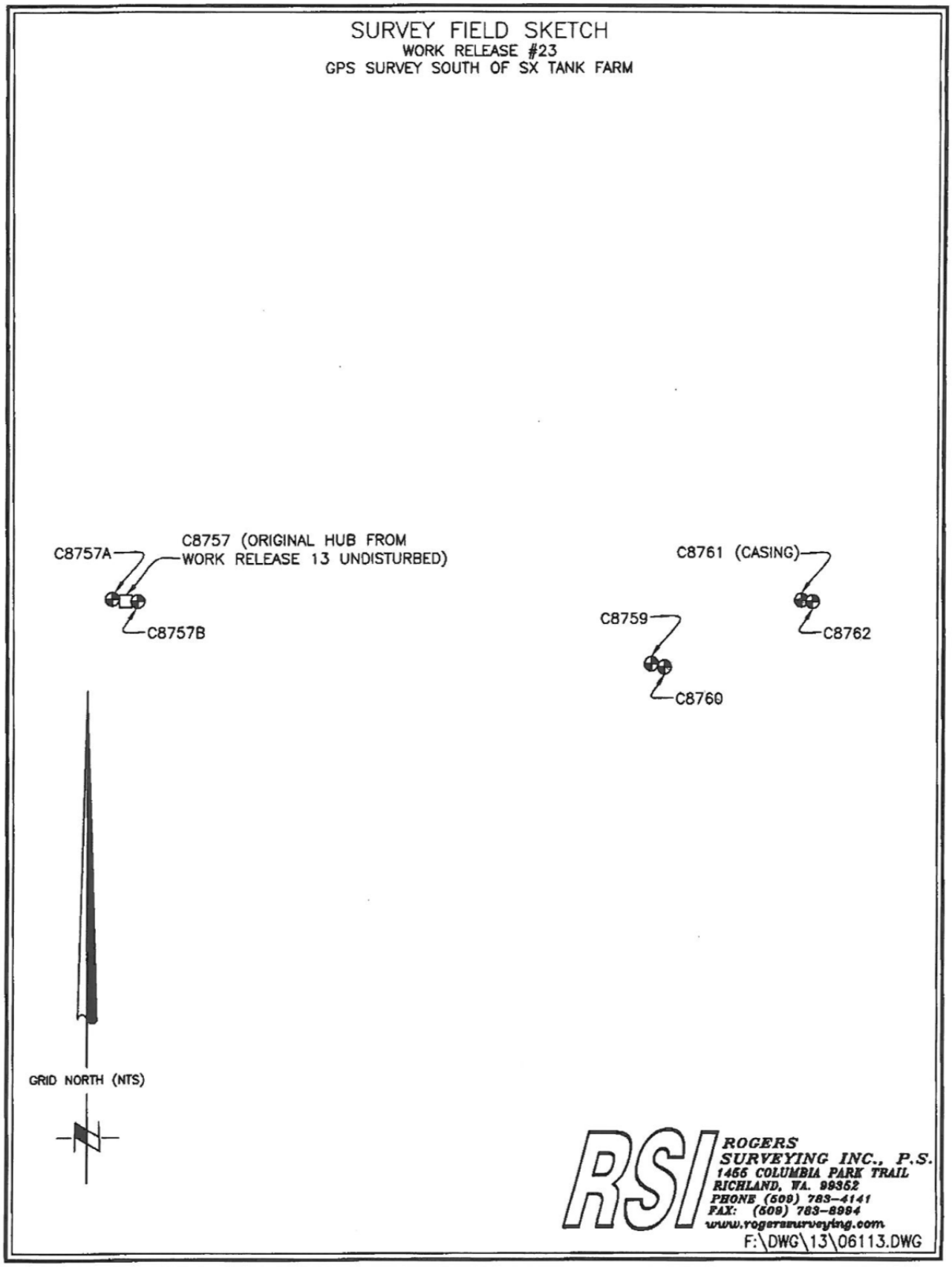
21. **Calibration and Functional Check Information:**
N/A

22. **Horizontal and Vertical Survey Datum:** NAD83/91 (Horizontal) NAVD88 (Vertical)

SURVEY RESULTS AND COMMENTS:

Page 1 of 1 A-6005-997 (REV 1)

RPP-RPT-56849, Rev. 0



GPS SURVEY "SOUTH OF SX TANK FARM"
FIELD SURVEY REPORT

	NAD83/91 COORDINATES			
POINT #	NORTHING (Y)	EASTING (X)	ELEVATION (Z)	DESCRIPTION
2835	134133.19	566771.96	199.05	C8757A (center of drill hole excavation)
2836	134133.01	566773.99	199.01	C8757B (center of drill hole excavation)
2837	134127.93	566814.86	199.42	C8759 (center of drill hole excavation)
2838	134127.68	566815.91	199.34	C8760 (center of drill hole excavation)
2839	134133.01	566826.92	199.63	C8761 (Centerline , top of casing)
2840	134132.90	566827.82	199.56	C8762 (center of drill hole excavation)

BNL TECH
ROGERS SURVEYING, INC., P.S. RICHLAND, WA
SUBCONTRACT 2012-011 WORK RELEASE 23
MARCH 2013

Revised 4/24/13 GBW

APPENDIX M

SAFETY DOCUMENTATION
ALL STAGES

This page intentionally left blank.

ENERGYSOLUTIONS
We're part of the solution

Field Safety and Health Inspection Report REV 1 2/2/11

Field Safety and Health Inspection Report					
Date	3/7/2013	*Time*	0930-1230	*Inspected by*	Kent Reynolds, Marty Gardner Kris Hutchings
Location	Hanford 200 W Area, South of 241 SX Tank Farm, Between Cooper and Camden Avenue				
Work Activities	SX Pore Water Extraction, Falling Head Test Day 1 Activities				
Weather Conditions	Clear Skies, Light Breeze, 55 F				

Observations (check all that apply)

Industrial Hygiene		*Industrial Safety*					
☐	IH Monitoring/Sampling	☒	Applicable PPE	☐	Heavy Equipment	☐	Excavations
☐	Hazard Communication	☐	Walking/Working Surfaces	☐	Elevating Work Platforms	☐	Underground Utilities
☐	Respiratory Protection	☒	Housekeeping	☐	Crane and Rigging	☐	Machine Guarding
☐	Confined Space	☐	Showers and Eyewash Stations	☒	Vehicular Traffic	☐	Rotating/Moving Equipment
☐	First Aid/Injury/Illness	☒	Electrical	☐	Fall Hazards	☒	Hand/Power Tools
☐	Heat Stress (WGBT)	☐	L.O.T.O.	☐	Falling Objects	☐	Stored Energy
☒	Ergonomics	☐	Overhead Utilities	☐	Ladders and Stairs	☐	Pinch Points
☐	Ventilation/IEQ	☒	Signs and Barricades	☐	Scaffolds	☐	Applicable Permits
☒	Noise and/or Vibration	☐	Fire Hazards	☐	Air/Steam/Fluid > 500 psi	☐	P.O.D. Meeting
☐	Lighting	☐	Compressed Gas Storage	☐	Steam/Fluid >200°F	☐	Work Documents
☐	Other IH	☐	Exits/Doors/Fire Lanes	☐	Employee Concern	☐	Other (Safety)

Comments/Items needing addressed

ERGONOMICS—Crew was observed using various techniques when assembling/disassembling the tremmie pipe to reduce repetitive motion fatigue. The falling head test required the addition set volumes of water at the direction of the contracted consultant. Workers performed the task required without skipping safe work practices that reduce the risk of an injury. No further actions required.

Page **1** of **6**

SIGNS and BOUNDARIES—Observers parked next to the other vehicles present and were informed by workers present there was a hardhat requirement inside the work boundary. Observers were unclear about the requirement for hardhats based on the following:

- Postings were observed near the entrance to the work site with signage communicating the requirements for hearing protection and authorized personnel only. These postings were not recognized as a work control boundary, as they were part of an incomplete boundary and did not cross the road to restrict/limit access.
- A complete boundary around the HHU-XL equipment was in place and observers found that it was posted for hearing protection and authorized personnel only. The complete nature of the boundary, along with the initially observed postings indicated the purpose was a work control boundary (*see attached images*). Observers also noted the yellow and magenta rope boundary, indicating a radiological function, but found only two signs designating it as an RBA were posted.
- Project personnel were observed in the same parking area as the observers without hardhats or safety glasses.
- The field work supervisor asked each observer to sign the daily site roster, but provided no further clarification on the definition of the work zone and/or the required PPE for the area the observers were located.

Because of PPE inconsistencies observed, and the absence of a posted barricade to communicate specific PPE requirements, a review of the worksite posting practices is recommended.

SIGNS and BOUNDARIES—Observed the personnel inside the RBA perform self surveys (*see attached images*) and then exit by ducking under the rope. Inquired about exit points after the workers exited the RBA. Workers were unaware of any exit points where the rope could be lowered. Upon further inquiry, one of the project personnel was able to show the other workers the locations of the exit points. The self survey area was moved next to the exit point, no further workers were observed ducking under the boundary.

NOISE—Crew staged the generator away from the work area to decrease noise exposure. Upon inquiry, crew was able to explain reducing occupational noise exposure by PPE was a last line of controls, after taking other steps to reduce exposure—like moving the sound source further away. Observers inquired about the positioning of the work control boundary and the verification of boundary placement with sound surveys. Workers were unsure if the data had been collected, or what the results were if it was collected.

It is recommended that all worksite layouts during direct push tasks be evaluated for noise. It is recommended that sound maps be generated in conjunction with routine sound surveys to ensure the worksite boundaries are properly placed. It is recommended that workers be provided information about their occupational noise exposure and that they participate in discussion of how to reduce their exposure.

ELECTRICAL/VEHICULAR TRAFFIC— When an electrical cord was found that appeared to have been driven over, workers demonstrated that they had unplugged the cord, allowed the vehicle access, and then reconnected the system (*see attached images*). Requested the cord be positioned further away from potential vehicle traffic. Observed a support personnel drive over the cord after it was repositioned (*see attached images*) Observed the repositioning of the contractor's vehicle and instruments prior to conducting the falling head test on the borehole to prevent the potential for a tripping hazard on stretched cables (*see attached images*).

ENERGYSOLUTIONS
We're part of the solution

Field Safety and Health Inspection Report REV 1 2/2/11

It is recommended that electrical safety practices / principles be reviewed with the work crew. Despite best effort to move the cord and prevent it from being driven over...it was. It is recommended that when electrical cords and portable electrical systems are used, the location of the cables and any administrative work practices to be used (such as moving the cord for vehicles) be covered during the daily morning meetings prior to work. It is recommended that power cords be protected by conduit, planks, or risers. Do not allow vehicles to drive over unprotected cords.

HAND/POWER TOOLS—No improper use of hand tools observed; tools were inspected prior to use and put away following use. During the falling head test, workers utilized a chain vice grip to hold the tremmie pipe in place (*see attached image*). No further actions required.

HOUSEKEEPING—(*see attached images*) The site layout was clean, with the minimal amount of tools and items needed inside the RBA. Waste bags were positioned to be easily accessible, and secured to prevent contents from spilling/blowing away. Items were staged within easy reach, tripping hazards minimized. No further actions required.

Signature/Date		Review Signature/Date	
KRIS HUTCHINGS	3/14/13	MG GARDNER	3/14/13
			3/18/13

Attached Images

ENERGYSOLUTIONS
We're part of the solution

Field Safety and Health Inspection Report REV 1 2/2/11

Detail: Cable Securement
During Falling Head Testing

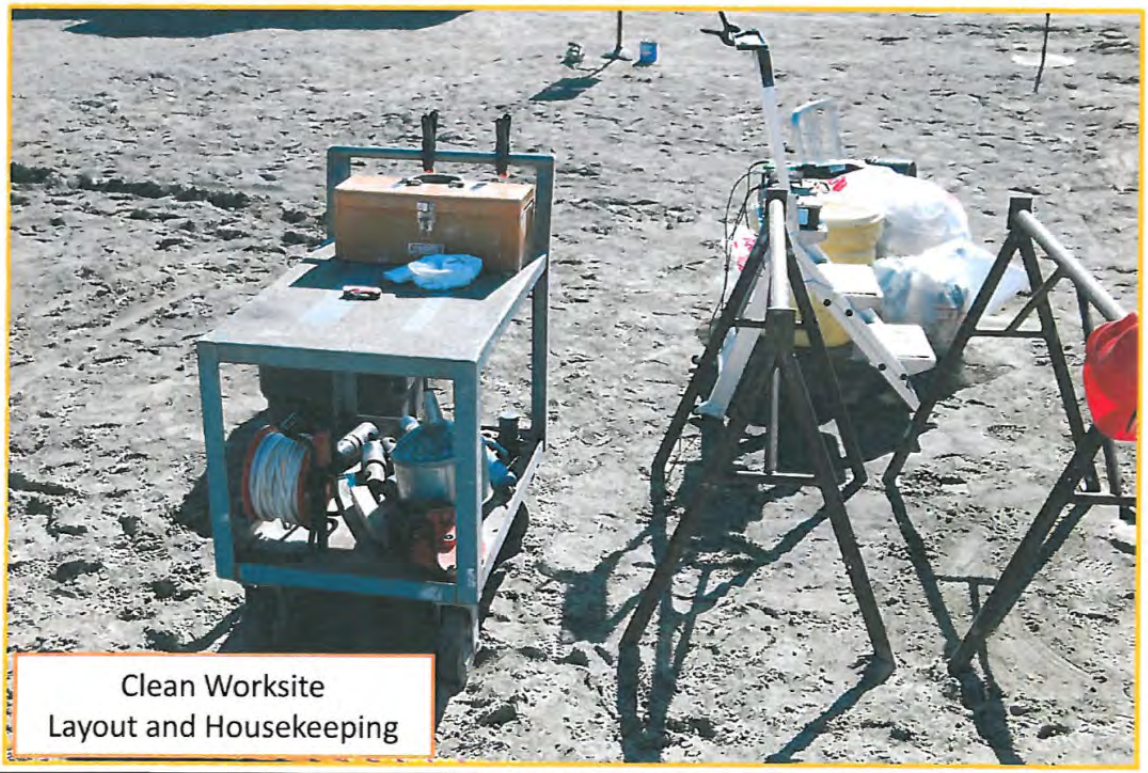
RED CIRCLE: RBA POSTINGS
YELLOW CIRCLE: WORK BOUNDARY POSTINGS

ENERGYSOLUTIONS
We're part of the solution

Field Safety and Health Inspection Report REV 1 2/2/11

EXIT SURVEY POINT OBSERVATIONS

ABOVE: Observed Exit Point; Ducking Under Boundary
RIGHT: Corrected Exit Point; Opened for Exit

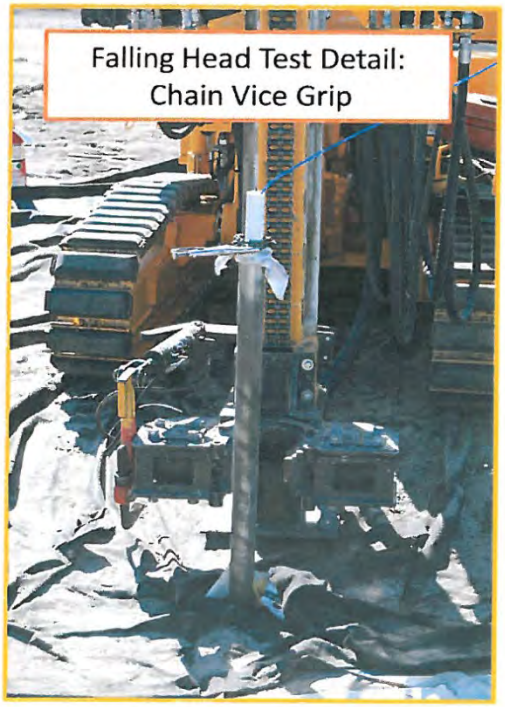


Clean Worksite
Layout and Housekeeping

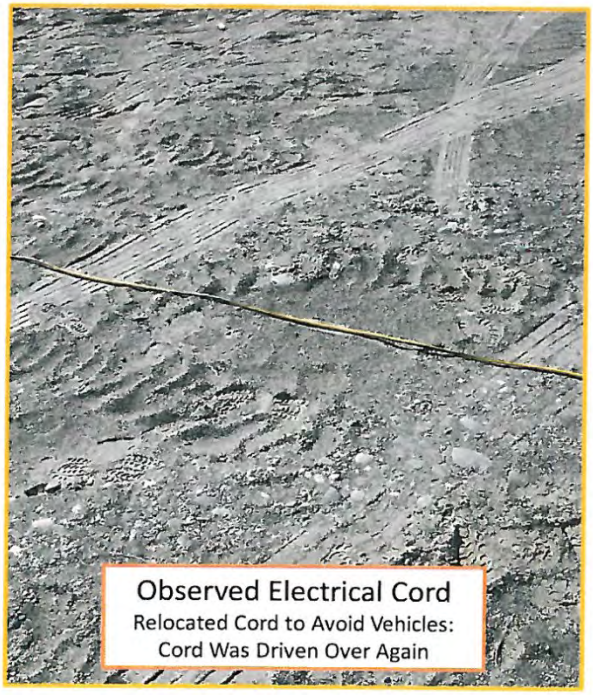
ENERGYSOLUTIONS
We're part of the solution

Field Safety and Health Inspection Report REV 1 2/2/11

Observed Site Configuration and Work Boundaries
(As seen from Parking Area)



Falling Head Test Detail:
Chain Vice Grip



Observed Electrical Cord
Relocated Cord to Avoid Vehicles:
Cord Was Driven Over Again

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part I: Background Information

Title: Completion Report for Direct Push Activities to Support SX Pore Water Extraction Test, Phases I-III

Information Category:
☐ Abstract ☐ Journal Article ☐ Summary
☐ Internet ☐ Visual Aid ☐ Software
☐ Full Paper ☑ Report ☐ Other

Publish to OSTI? ☐ Yes ☑ No

Trademark/Copyright "Right to Use" Information or Permission Documentation	Yes ☐	NA ☑

Document Number: RPP-RPT-56849 Revision 0 Date: July 2014

Author: Tabor, Cindy L

Part II: External/Public Presentation Information

Conference Name:

Sponsoring Organization(s): WRPS

Date of Conference: Conference Location:

Will Material be Handed Out? ☐ Yes ☑ No Will Information be Published? ☐ Yes ☑ No *(If Yes, attach copy of Conference format instructions/guidance.)*

Part III: WRPS Document Originator Checklist

Description	*Yes*	*N/A*	*Print/Sign/Date*
Information Product meets requirements in TFC-BSM-AD-C-01?	☐	☑	
Document Release Criteria in TFC-ENG-DESIGN-C-25 completed? (Attach checklist)	☐	☑	
If product contains pictures, safety review completed?	☑	☐	Roberts, Sheryl K Approved via att. IDMS data file.

Part IV: WRPS Internal Review

Function	*Organization*	*Date*	*Print Name/Signature/Date*
Subject Matter Expert	WRPS		Tabor, Cindy L Approved via att. IDMS data file.
Responsible Manager	WRPS		Rutland, Paul L Approved via att. IDMS data file.
Other:			

Part V: IRM Clearance Services Review

Description	*Yes*	*No*	*Print Name/Signature*
Document Contains Classified Information?	☐	☑	If Answer is "Yes," ADC Approval Required Print Name/Signature/Date
Document Contains Information Restricted by DOE Operational Security Guidelines?	☐	☑	Reviewer Signature: Print Name/Signature/Date
Document is Subject to Release Restrictions? *If the answer is "Yes," please mark category at right and describe limitation or responsible organization below:*	☐	☑	Document contains: ☐ Applied Technology ☐ Protected CRADA ☐ Personal/Private ☐ Export Controlled ☐ Proprietary ☐ Procurement – Sensitive ☐ Patentable Info. ☐ OUO ☐ Predecisional Info. ☐ UCNI ☐ Restricted by Operational Security Guidelines ☐ Other (Specify)
Additional Comments from Information Clearance Specialist Review?	☐	☑	Information Clearance Specialist Approval APPROVED By Julia Raymer at 2:54 pm, Apr 20, 2020 Print Name/Signature/Date

When IRM Clearance Review is Complete – Return to WRPS Originator for Final Signature Routing (Part VI)

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part VI: Final Review and Approvals

Description	*Approved for Release*		*Print Name/Signature*
	Yes	*N/A*	
WRPS External Affairs	☑	☐	Approved via att. IDMS data file.
WRPS Office of Chief Counsel	☑	☐	Approved via att. IDMS data file.
DOE – ORP Public Affairs/Communications	☑	☐	Approved via att. IDMS data file.
Other: ORP SME & OCC	☑	☐	Approved via att. IDMS data file.
Other:	☐	☐	

Comments Required for WRPS-Indicate Purpose of Document:

This report details field activities for using small diameter soil borings for extracting pore water from partially saturated sediments. Stage I included field activates to obtain additional information at prospective sites. Stage II includes collecting soil samples for identifying preferred test location and designing test equipment associated with monitoring systems. Stage III includes procurement and installation of monitoring system in four new soil borings.

APPROVED
By Julia Raymer at 3:02 pm, Apr 20, 2020

Approved for Public Release;
Further Dissemination Unlimited

Information Release Station

Was/Is Information Product Approved for Release? ☑ Yes ☐ No

If Yes, what is the Level of Releaser? ☑ Public/Unrestricted ☐ Other (Specify) _____

Date Information Product Stamped/Marked for Release: 4/20/2020

Was/Is Information Product Transferred to OSTI? ☐ Yes ☑ No

Forward Copies of Completed Form to WRPS Originator

```
- <workflow name="(JRR) RPP-RPT-56849, Rev. 0" id="260317510">
  - <task name="Clearance Process" id="0" date-initiated="20200409T1021"
      performer="Julia R Raymer" performer-id="164931488" username="h3310581">
      <comments>Please approve RPP-RPT-56849, Rev. 0, for public release. POC:
        Cindy Tabor (509) 373-3981 Thank you, Julia Raymer (509) 373-
        0230</comments>
    </task>
    <task name="Add XML" id="1" date-done="20200409T1021" />
    <task name="Manager Approval" id="41" date-due="20200414T1021" date-
      done="20200409T1027" performer="Paul L Rutland" performer-id="140633218"
      username="h4494439" disposition="Approve" authentication="true" />
    <task name="Document Reviewer2" id="53" date-due="20200414T1027" date-
      done="20200409T1207" performer="Mark McKenna" performer-id="182697281"
      username="h1903617" disposition="Public Release" authentication="true" />
    <task name="Document Reviewer1" id="54" date-due="20200414T1027" date-
      done="20200413T1249" performer="Sheryl K Roberts" performer-
      id="171787680" username="h0081997" disposition="Public Release"
      authentication="true" />
    <task name="Document Reviewer4" id="51" date-due="20200414T1027" date-
      done="20200414T1052" performer="Rebecca I Blackwell" performer-
      id="242759597" username="h9138590" disposition="Public Release"
      authentication="true" />
    <task name="Document Reviewer3" id="52" date-due="20200414T1027" date-
      done="20200414T1057" performer="Amber D Peters" performer-
      id="210402196" username="h3022486" disposition="Public Release"
      authentication="true" />
    <task name="Doc Owner Clearance Review" id="13" date-due="20200415T1057"
      date-done="20200414T1105" performer="Cynthia L Tabor" performer-
      id="173738849" username="h6436378" disposition="Send On"
      authentication="true" />
    <task name="Milestone 1" id="24" date-done="20200414T1106" />
    <task name="ORP Document Reviewer1" id="57" date-due="20200416T1105"
      date-done="20200414T1119" performer="Benjamin J Zelen" performer-
      id="141965018" username="h1214744" disposition="Public Release"
      authentication="true" />
  - <task name="ORP Document Reviewer2" id="58" date-due="20200416T1105"
      date-done="20200415T1022" performer="Yvonne M Levardi" performer-
      id="185346745" username="h7131303" disposition="Public Release"
      authentication="true">
      <comments>Approved upon incorporation of comments 1.0 in the
        introduction, that first sentence does not make sense. DOE did not assign
        the RPP to anyone, DOE awarded the tank operations contract to WRPS -
        make that factually accurate. 4.0, p. 27, should be "Decommissioning ...
        WAS conducted" not were p A-5 - change the third sentence of the first
        paragraph to, "The tanks were used for storage of chemical and
        radioactive waste produced ..." CHANGE THIS in appendix B too Again in
        1.2 on page A-5, that first sentence, I don't know that DOE "assigned" the
        RPP - DOE awards contracts for work to be completed. CHANGE in
        appendix b too</comments>
    </task>
    <task name="ORP Document Reviewer3" id="59" date-due="20200416T1105"
      date-done="20200417T0915" performer="Geoff T Tyree" performer-
      id="6158846" username="h0068565" disposition="Public Release"
      authentication="true" />
```

```
  <task name="Doc Owner Reviews ORP Comments" id="61" date-
    due="20200420T0915" date-done="20200420T0809" performer="Cynthia L
    Tabor" performer-id="173738849" username="h6436378" disposition="Send On"
    authentication="true" />
  <task name="Milestone 2" id="62" date-done="20200420T0809" />
  <task name="Verify Doc Consistency" id="4" date-due="20200421T0809" date-
    done="20200420T1439" performer="Julia R Raymer" performer-id="164931488"
    username="h3310581" disposition="Cleared" authentication="true" />
</workflow>
```