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This report summarizes field activities performed during drilling, sampling, and decommissioning of 11 direct pushes in the area around Tank 241-A-104 and Tank 241-A-105 in Waste Management Area A-AX. Field characterization will support development of a Resource Conservation and Recovery Act of 1976 facility investigation/corrective measure study work plan, which will present the preliminary conceptual site model and provide context for risk-informed tank waste retrieval at Waste Management Area A-AX.

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Completion Report for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)

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Completion Report for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)

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ACRONYMS

Atkins	Atkins Energy Federal EPC, Inc.
bgs	below ground surface
cm	centimeter
CMS	Corrective Measures Study
DOE	U.S. Department of Energy
DOE-ORP	U.S. Department of Energy-Office of River Protection
DOW	Description of Work
Ecology	Washington State Department of Ecology
ERT	Electrical Resistivity Tomography
ft	feet
GPS	Global Positioning Satellite
in.	inch
SST	Single Shell Tank
WAC	*Washington Administrative Code*
WMA	Waste Management Area
WRPS	Washington River Protection Solutions, LLC

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1.0 INTRODUCTION

This report summarizes field activities performed during drilling, sampling, and decommissioning of 11 direct pushes in the area around Tank 241-A-104 (A-104) and Tank 241-A-105 (A-105) in Waste Management Area (WMA) A-AX. Field characterization will support development of a *Resource Conservation and Recovery Act of 1976* facility investigation (RFI)/corrective measure study (CMS) work plan, which will present the preliminary conceptual site model and provide context for risk-informed tank waste retrieval at WMA A-AX.

WMA A-AX is part of the Hanford single-shell tank (SST) system; A-AX is located in the 200 East Area of the Hanford Site. AX Farm consists of four-, and A Farm consists of six 100 series SSTs, each with 1,000,000 gallon capacity. The A-AX Farm includes an extensive waste transfer system of pipelines (transfer lines), diversion boxes, vaults, valve pits, and other structures (above and below grade). Tanks A-104 and A-105 are both approximately 75-feet (ft) in diameter with a 44-ft depth and constructed with a carbon steel liner within a cylindrical reinforced concrete shell. The tanks were designed for the storage of boiling waste generated from irradiated fuel reprocessing at the Plutonium-Uranium Extraction Plant. Multiple drywells surround each of the tanks for leak detection. Tanks A-104 and A-105 are both designated as "confirmed leakers" and the area surrounding the tanks is identified as WMA A-AX Focus Area 1.

Work consisted of using the hydraulic hammer system for direct push of temporary casing (tubing) advancement, geophysical logging, electrical resistivity tomography (ERT) sensor installation, and vadose zone soil sample collection in WMA A-AX Focus Area 1. Atkins Energy Federal EPC, Inc. (Atkins) performed the field activities, under direction of Washington River Protection Solutions, LLC (WRPS).

1.1 PURPOSE, SCOPE, AND GENERAL INFORMATION

This document summarizes the observations and measurements made during the performance of the WMA A-AX Focus Area 1 vadose zone direct push campaign. Technical requirements and detailed descriptions of the intended scope of work for this project are provided in PL-5166670-EG-0001, *Description of Work: 241-A Tank Farm Direct Push Vadose Characterization FY 2018/2019,* Rev. 2 (Appendix A). Atkins was responsible for providing equipment and personnel to conduct direct push activities, geophysical logging services, soil sample collection, safety oversight, and technical support.

Documentation of work activities are provided in this report. The following appendices contain copies of documentation generated during the performance of the above work scope:

Appendix A. PL-5166670-EG-0001, *Description of Work: 241-A Tank Farm Direct Push Vadose Characterization FY 2018/2019,* Rev. 2
Appendix B. Drilling and Sampling Daily Work Records

Appendix C. Direct Push Photographs
Appendix D. Characterization Deviation Forms
Appendix E. Washington State Department of Ecology Documents
Appendix F. Geophysical Logging Results for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)
Appendix G. Sample Interval Selection Meeting Minutes
Appendix H. Direct Push Location Information
Appendix I. Safety Documentation.

Additionally, guidance documentation and preparation for control of field activities were completed with the release of the following documents:

- *Description of Work: 241-A Tank Farm Direct Push Vadose Characterization FY 2018/2019,* (PL-5166670-EG-0001 Rev. 2).
- WRPS Work Package*, Vadose Perform Angle Direct Push at 241-A Tank Farm* (TFC-WO-377428).
- *WRPS Job Hazard Analysis Checklist, Direct Push Operations*
- *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* (RPP-PLAN-62041)
- *Radiological Work Permit* AX-063 Rev. 04 *(241-A Vadose)*
- *Respiratory Protection Form* TFC-ESHQ-IH-STD-07 Rev. 12
- Industrial Hygiene Sample Plans IHSP-RETR-A-11 Rev. 4
- *Hanford Site Excavation Permit* DAN18-0125
- *Engineering Change Notice* ECN-714221 Rev. 01

2.0 DIRECT PUSH FIELD WORK

Field work began on June 7, 2018, with the mobilization and staging of a direct push rig and associated equipment inside 241-A Tank Farm. Work was completed on August 29, 2019 with the radiological release survey and demobilization of the direct push rig. There were 252 working field days. Delays (or downtime) of approximately 60 days were caused primarily by respiratory equipment issues, lack of resources, and technical issues such as: safety pauses and meetings, equipment problems, weather-related shutdowns, construction and administrative issues.

Five locations were planned to investigate WMA A-AX Focus Area 1. The direct push locations around Tanks A-104 and A-105 were selected for soil sampling based on information related to tank releases including possible leak locations. In accordance with DOW PL-5166670-EG-0001, Rev. 2, the placement of pushes was accomplished using a hydraulic hammer system. The lightweight hydraulic rotary hammer advances or “pushes” the drill-string into the ground (the “push” method eliminates soil cuttings that are brought to the surface with other drilling methods). Holes were pushed, using a 6.35 cm (2.5-in.) outside diameter by 4.45 cm (1.75-in.) inside diameter steel tubing, at predetermined locations to specified depths, or refusal.

Each location required two direct pushes, the first for geophysical logging and ERT sensor installation and the second push for soil sample collection. The five locations selected for soil sampling required four angled direct pushes and one vertical direct push. The ten pushes were completed as planned (an eleventh push was advanced and used as a replacement for a push with damaged casing). Figure 2-1 shows the five locations investigated for Focus Area 1.

The work scope consisted of using a hydraulic hammer system to drive eight angled and two vertical direct pushes. The angled pushes varied in dip from 75° to 21° (measured from horizontal). The longest pushes (four angled) were advanced for a distance of approximately 298 ft (measured in 'pipe run'). Direct pushes of these lengths are considered the maximum range for this equipment, which can create operational challenges. Table 2-1 summarizes the planned and final measurements of the 11 WMA A-AX Focus Area 1 pushes.

Appendices B and C provide information on day to day activities (i.e., Drilling and Sampling Daily Work Records and Direct Push Photographs, respectively). Appendices D and E provide documentation of work activities which deviated from RPP-PLAN-62041 and state requirements (Characterization Deviation Forms and Washington State Department of Ecology [Ecology] Documents, respectively). This section is organized in the following subsections:

- Section 2.1 Geophysical Logging
- Section 2.2 Soil Sampling
- Section 2.3 Decommissioning and Resistivity Sensor Placement
- Section 2.4 Challenges and Lessons Learned

2.1 GEOPHYSICAL LOGGING

Atkins and Three Rivers Scientific conducted the geophysical logging data collection. For the geophysical logging, a portable small diameter logging system was used to collect spectral gamma, moisture, and temperature data from the bottom of the hole to the ground surface. Appendix F contains copies of the collected and processed geophysical logging data with data observations and conclusions.

Geophysical logging performed on the exploratory holes included collecting spectral gamma data using a combination cerium bromide/bismuth germanium oxide instrument and collecting neutron-neutron moisture and temperature data. Electrical Resistivity Tomography assemblies were installed in the four angled exploratory holes as they were decommissioned. Section 2.3 of this report contains additional details regarding ERT sensor placement and completion of those exploratory pushes.

A slim-hole borehole gyroscope was utilized to provide actual trajectory data for each angled direct push. The gyroscope log was run twice in each push. The initial run was conducted once the drive tubing had been advanced to a vertical depth of approximately 45 ft below ground surface (bgs). The purpose of this initial log was to verify the trajectory was within the specified target window that would ensure the push tubing would pass safely by the SST footing. The second gyroscope log was run at total depth of each push and data collected was plotted to

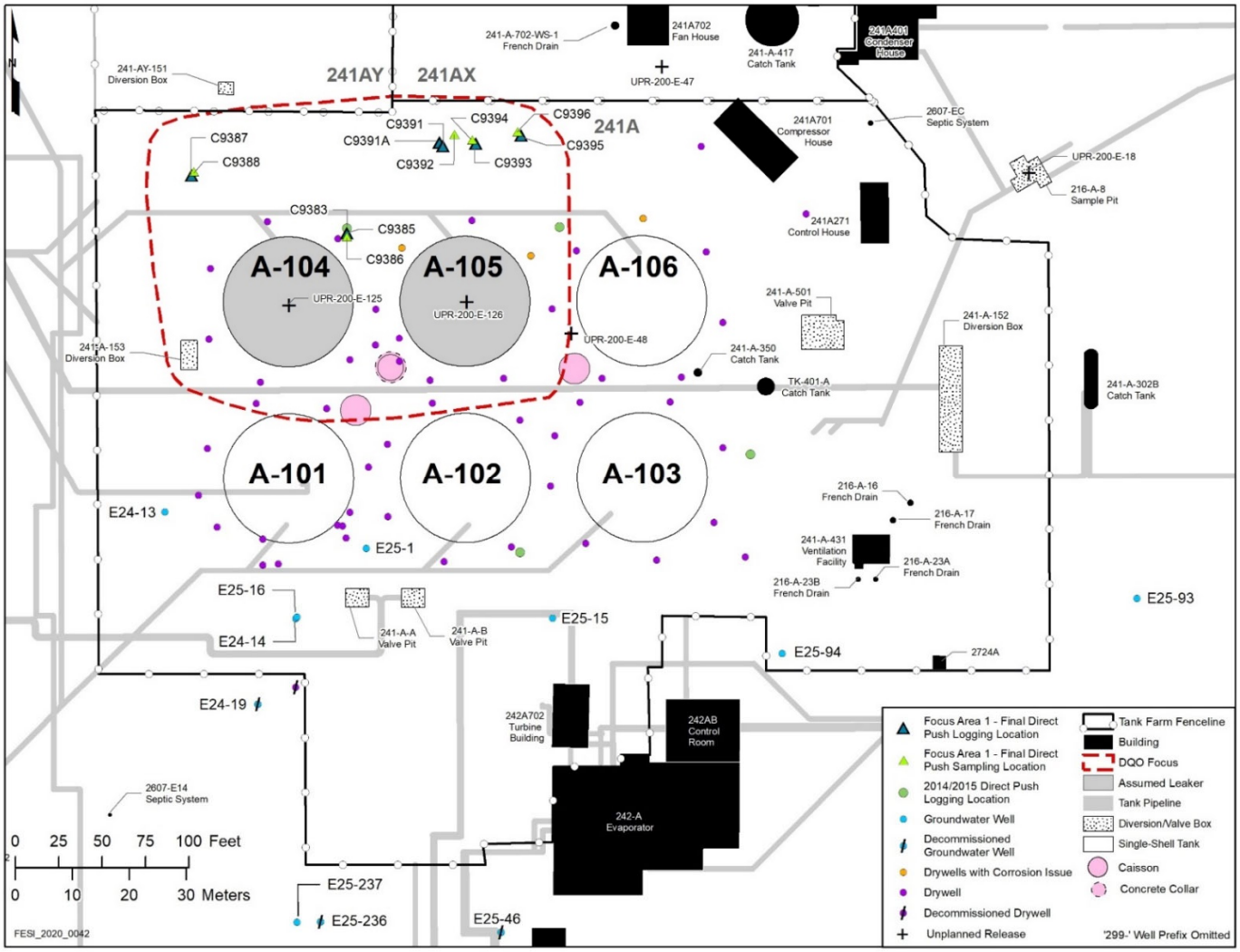
provide the actual trajectory of each push. The gyroscope data from the exploratory pushes was correlated with the geophysical log data to calculate target depths for sample picks. After collection of the samples from the sampling pushes, the gyroscope data was used to calculate the actual depths for samples collected. Gyroscope survey plots are provided in Appendix F.

2.2 SOIL SAMPLING

In accordance with DOW PL-5166670-EG-0001, Rev. 2, soil sampling was accomplished with a dual-wall sampling system. The sampling system consisted of a 6.67 cm (2.625-in.) outside diameter, 4.76 cm (1.875-in.) inside diameter outer sample barrel, which holds a 4.13 cm (1.625-in.) outside diameter inner sample barrel that is 48.63 cm (18.75-in.) long. The inner sample barrel houses three 3.18 cm (1.25 in) outside diameter, 2.7 cm (1.06 in) inside diameter, 15.24 cm (6 in.) long stainless-steel sample liners. The outer sample barrel is attached to 6.67 cm (2.625-in.) outside diameter, 4.76 cm (1.875-in.) inside diameter drive tubing. The inner barrel is attached to 2.54 cm (1 in.) outside diameter inner rod. The inner barrel is interchangeable with a removable drive tip. The drive tubing with the drive tip in place is driven to the target sample depth, then removed and replaced with the inner sample barrel. The sampling system is typically driven 0.61 meters (2 ft), then removed to retrieve the sample. The drive tip is then reinserted and the drive tubing advanced to the next target sample depth and the process repeated.

Five sample holes were pushed adjacent to each exploratory push. Sample selection meetings were held to determine the intervals to be sampled. Geophysical logs, from relevant exploratory holes, were used to assist in determining sample depths by evaluating areas of increased moisture, temperature, and/or gamma readings. Meeting minutes for sample depth selection are provided in Appendix G. Samples were collected, processed, and then delivered to the 222-S Laboratory and analyzed per RPP-PLAN-62041. Refer to Table 2-2 for sample locations, numbers and depths of samples.

Figure 2-1. Surface Location of WMA A-AX Focus Area 1 Direct Pushes



Note: Push C9391A had pipe separation and could not be geophysically logged. The push was replaced by C9391. Push C9383 is part of the 2014/2105 campaign and is included for reference purposes.

Table 2-1. Planned and Final Measurements of the WMA A-AX Focus Area 1 Direct Pushes

Direct Push ID	Planned Azimuth (degrees from true North)	Final Azimuth (degrees from true North)	Planned Dip (degrees from Horizontal)[b]	Final Dip (degrees from Horizontal)	Planned Depth (ft pipe run)	Final Depth (ft pipe run)	Planned Depth (ft bgs)	Final Depth (ft bgs)
C9385	0	-[a]	90	-[a]	285[b]	285.5	285[b]	285.5
C9386					277[c]	277.0	277[c]	277.0
C9387	150	109	55	33	295[b]	298.0	242[b]	217.3
C9388		132		21	292[c]	292.0	216[c]	190.2
C9391	195	169	60	46	279[b]	278.7	241[b]	226.7
C9391A		-[a]		-[a]		279.7		-[a]
C9392		169		25	268[c]	268.0	219[c]	183.7
C9393	180	208	75	63	295[b]	295.1	285[b]	271.0
C9394		150		59	295[c]	295.0	273[c]	277.2
C9395	180	198	45	32	197[b]	196.8	139[b]	126.6
C9396		159		31	178[c]	178.0	115[c]	113.2

a. A gyroscope survey was not performed at this location.
b. RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)*
c. Based on depth of final selected sample interval. See Appendix D for sample depth meeting notes.

ft bgs = feet below ground surface

Table 2-2. Sample Intervals

Direct Push ID	Depth (ft pipe run unless otherwise noted)	Sample Numbers	Approximate Percent Recovery
C9386 (Vertical)	Surface	B3L2V4	NA
	Surface Duplicate	B3L2V6	NA
	7-9 ft bgs	B3K515, B3K512, B3K513, B3K514	94
	12-14 ft bgs	B3K522, B3K519, B3K520, B3K521	88
	53-55 ft bgs	B3K529, B3K526, B3K527, B3K528	88
	Equipment Blank	B3M4C9, B3K585	NA
	75-77 ft bgs	B3K536, B3K533, B3K534, B3K535	94
	Field Blank	B3M4D0, B3K584	NA
	132-134 ft bgs	B3K543, B3K540, B3K541, B3K542	94
	210-212 ft bgs	B3K550, B3K547, B3K548, B3K549	100
	263-265 ft bgs	B3K557, B3K554, B3K555, B3K556	100
	273-275 ft bgs	B3K564, B3K561, B3K562, B3K563	100
	275-277 ft bgs	B3K571, B3K568, B3K569, B3K570	80
C9388 (Angled)	Surface	B3M4N5	NA
	9-11	B3M4D6, B3M4D3, B3M4D4, B3M4D5	100
	15-17	B3M4F3, B3M4F0, B3M4F1, B3M4F2	100
	63-65	B3M4H0, B3M4F7, B3M4F8, B3M4F9	100
	124-126	B3M4H7*, B3M4H4, B3M4H5, B3M4H6	56
	141-143	B3M4J4, B3M4J1, B3M4J2, B3M4J3	100
	161-163	B3M4K1, B3M4J8, B3M4J9, B3M4K0	100
	184-186	B3M4K8, B3M4K5, B3M4K6, B3M4K7	70
	203-205	B3M4L5, B3M4L2, B3M4L3, B3M4L4	100
	Field Blank	B3M4N1, B3M4N2	NA
	Equipment Blank	B3M4N3, B3M4N4	NA
	290-292	B3M4M2, B3M4L9, B3M4M0, B3M4M1	94
C9392 (Angled)	Surface	B3M4R7	NA
	8-10	B3M4D1, B3K586, B3K587, B3L2V8	78
	14-16	B3M4W2, B3M4V9, B3M4W0, B3M4W1	81
	54-56	B3M4W9, B3M4W6, B3M4W7, B3M4W8	98

Table 2-2. Sample Intervals

Direct Push ID	Depth (ft pipe run unless otherwise noted)	Sample Numbers	Approximate Percent Recovery
	60-62	B3M4X6, B3M4X3, B3M4X4, B3M4X5	94
	113-115	B3M4Y3, B3M4Y0, B3M4Y1, B3M4Y2	100
	158-160	B3M500, B3M4Y7, B3M4Y8, B3M4Y9	90
	190-192	B3M507, B3M504, B3M505, B3M506	90
	254-256	B3M514, B3M511, B3M512, B3M513	92
	262-264	B3M521, B3M518, B3M519, B3M520	90
	266-268	B3M528, B3M525, B3M526, B3M527	93
C9394 (Angled)	Surface	B3M595	100
	7-9	B3M5B7, B3M5B5, B3M546, B3M5B6	69
	12-14	B3M5C4, B3M5C1, B3M5C2, B3M5C3	99
	107-109	B3M5D1, B3M5C8, B3M5C9, B3M5D0	94
	146-148	B3M5D8, B3M5D5, B3M5D6, B3M5D7	100
	164-166	B3M5F5, B3M5F2, B3M5F3, B3M5F4	90
	177-179	B3M5H2, B3M5F9, B3M5H0, B3M5H1	80
	196-198	B3M5H9, B3M5H6, B3M5H7, B3M5H8	94
	288-290	B3M5J6, B3M5J3, B3M5J4, B3M5J5	83
	293-295	B3M5K3, B3M5K0, B3M5K1, B3M5K2	88
C9396 (Angled)	Surface	B3M5M8	NA
	Surface Duplicate	B3M5N1	NA
	10-12	B3M5P1, B3M5N8, B3M5N9,B3M5P0	85
	17-19	B3M5P8, B3M5P5, B3M5P6, B3M5P7	82.5
	78-80	B3M5R5, B3M5R2, B3M5R3, B3M5R4	94
	97-99	B3M5T2, B3M5R9, B3M5T0, B3M5T1	94
	99-101	B3M5T9, B3M5T6, B3M5T7, B3M5T8	90
	105-107	B3M5V6, B3M5V3, B3M5V4, B3M5V5	90
	Field Blank	B3M5N4, B3M5N5	NA
	Equipment Blank	B3M5N6, B3M5N7	NA

Table 2-2. Sample Intervals

Direct Push ID	Depth (ft pipe run unless otherwise noted)	Sample Numbers	Approximate Percent Recovery
	162-164	B3M5W3, B3M5W0, B3M5W1, B3M5W2	90
	176-178	B3M5X0, B3M5W7, B3M5W8, B3M5W9	90

*No soil was recovered from the shoe
ft bgs = feet below ground surface
ID = identification
NA = not applicable

2.3 DECOMMISSIONING AND RESISTIVITY SENSOR PLACEMENT

Decommissioning of the sampling pushes was conducted in accordance with the *Washington Administrative Code* (WAC) 173-160 requirements. To decommission the sample pushes, the tubing was back pulled while granular bentonite was simultaneously added to the tubing until it reached the surface.

The exploratory (logging) pushes have not been decommissioned in accordance with WAC-173-160-460; they are considered instrumentation wells. With the exception of the vertical push (C9385), decommissioning was accomplished by knocking the drive tip out of the bottom of the tubing then back pulling the tubing approximately 6 ft. With the aid of a long fiberglass rod and ½ in. polyethylene tubing, a multi-sensor ERT electrode was inserted to the bottom of the push. The fiberglass rod was then removed, leaving the sensor and tubing in place. A 68/32 percent mixture of pumice powder and Portland cement was then mixed to a thin slurry and pumped down through the ½ in. tubing to the bottom of the hole. Extraction of piping and tubing were done simultaneously while additional batches of pumice/cement was pumped down the hole, encasing the entire sensor from bottom, to ground surface. Each ERT array contains 32 separate electrodes. A protective steel casing was then buried in place approximately 60.96 cm (24 in.) deep at the surface to protect the protruding sensor wiring. The protective steel casing was then identified with Ecology well tags and brass tags, each stamped with a unique well identifier. Coordinates and elevations for each sensor is included in Appendix F. Documentation required by WAC 173-160 was submitted to Ecology and is provided, for informational purposes, in Appendix E.

The depths at which the bottom sensor was set and the length of sensor separation in each push is identified below:

- C9385, no sensors placed.
- C9387, bottom sensor at approximately 295.6 ft pipe run, with sensor every 9 ft.
- C9391A, no sensors placed.
- C9391, bottom sensor at approximately 276.4 ft pipe run, with sensor every 8.5 ft.
- C9393, bottom sensor at approximately 292.7 ft pipe run, with sensor every 9 ft.
- C9395, bottom sensor at approximately 194.8 ft pipe run, with sensor every 6 ft.

2.4 CHALLENGES AND LESSONS LEARNED

One of the major challenges associated with this field work was that the vadose zone tank farm field program was shut down in 2015 with a hiatus until the summer of 2018. Due to the length of the shutdown, the entire program needed to be re-started, which takes re-training and time. Additionally, the specialized equipment and drill rigs needed to perform work in tank farms were not in use during the shutdown, which can negatively affect functionality.

Work in A Farm for Focus Area 1 surpassed any work ever performed in tank farms because deeper depths were pushed. Initially, some breaks in tubing occurred as it was discovered that re-using tubing from previous field investigations, which had been left exposed to the weather, compromised the integrity of the carbon steel tubing. This caused it to fail when pushing to these deeper depths. After this, new tubing was purchased, as needed. These breaks in tubing did not cause any significant delays.

In addition, there were two specific issues which occurred at logging holes (C9385 and C9391). As identified in meeting notes in Appendix G, push tubing breaks occurred at two direct push locations, first at vertical location C9385 and then at angled location C9391, 72 ft bgs and 180 ft pipe run, respectively. These were the first two locations pushed for the field effort. Additionally, the High Energy Resolution gamma logging tool with the cerium bromide crystal was damaged while logging at C9385.

Meeting notes contain an email dated September 20, 2018 from Mike Barnes (Ecology) providing concurrence that C9385 did not need to be re-pushed because moisture and temperature profiles of C9385 and C9383, a vertical location approximately 2 ft away, were consistent (refer to Figure 2-1 for location of pushes).

It was also identified in September 2018, that it would be problematic to install ERT sensors in C9385. Ecology verbally identified that they were not necessary due to the close proximity to C9383, which has ERT sensors. C9385 was decommissioned using bentonite granules to fill the push cavity, while abandoning approximately 218 ft of broken off push tubing in the ground.

When the push tubing broke while driving at C9391, Mike Barnes also indicated that it should be re-pushed because:

- It would not be possible to determine where moisture zones are present or if thin beds are located deep in the subsurface.
- The surface geophysical exploration data shows a highly conductive area and the drywells 10-05-09, 10-04-04, and 10-04-05 all show high temperature anomalies.
- It is very important to have the logging information to assist with selecting the deep sampling intervals.

Based upon this recommendation and agreement by DOE, WRPS directed a second, replacement push to be advanced approximately 2 ft east of the original location. The original C9391 push was decommissioned using bentonite crumbles to fill the push cavity, while abandoning

approximately 102 ft of broken off push tubing in the ground. The original push designation then became C9391A and the final push became C9391 (refer to Figure 2-1).

Overall, equipment factors included gyroscope issues and equipment cart issues. Both of these equipment issues occurred due to the equipment being idle during the shutdown period. Both issues have been since resolved by having obtained back-up gyroscope and equipment cart.

3.0 GLOBAL POSITIONING SATELLITE SURVEYING

In accordance with PL-5166670-EG-0001, Rev. 2, a professional land surveyor (Rogers Surveying, Inc.), marked the original locations of the exploratory holes using a Trimble[1] 5800 Global Positioning Satellite Survey system, or equivalent. At the beginning of the project, the locations were marked using paint and stakes. After locations were decommissioned, the direct push holes were surveyed to obtain final coordinates and elevations. The final survey report is provided in Appendix H.

4.0 ENVIRONMENTAL, SAFETY, AND HEALTH

There was no safety surveillance performed during these 241-A and 241-AX Tank Farm field activities. 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. Associated safety documentation is provided in Appendix I.

5.0 REFERENCES

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

AW-2808 Rev. 005, *Alara Management Worksheet,* Washington River Protection Solutions, LLC, Richland, Washington.

AX-063 Rev. 06, *Radiological Work Permit (241-A-Vadose),* Washington River Protection Solutions, LLC, Richland, Washington.

DAN18-0125 *Hanford Site Excavation Permit*

ECN-714221 Rev. 01, *Engineering Change Notice*

[1] Trimble is a registered trademark of Trimble Navigation Ltd., Sunnyvale, California.

IHSP-CMHZ-83 Rev. 2, *Industrial Hygiene Sample Plan,* Washington River Protection Solutions, LLC, Richland, Washington.

IHSP-EABO11077, Rev. 4, *Industrial Hygiene Sample Plan,* Washington River Protection Solutions, LLC, Richland, Washington.

IHSP-RETR-A-11 Rev. 4, *Industrial Hygiene Sample Plan,* Washington River Protection Solutions, LLC, Richland, Washington.

PL-5166670-EG-0001 Rev. 2, *Description of Work: 241-A Tank Farm Direct Push Vadose Characterization FY 2018/2019*

RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)*, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-WO-377428, *WRPS Work Package, Vadose Perform Angle Direct Push at 241-A*, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ESHQ-IH-STD-07 Rev. 12, *Respiratory Protection Form,* Washington River Protection Solutions, LLC, Richland, Washington.

TVIS-A-001, *Tank Farm Information Sheet,* Washington River Protection Solutions, LLC, Richland, Washington.

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

WRPS Job Hazard Analysis Checklist, Direct Push Drywells for 377428, Washington River Protection Solutions, LLC, Richland, Washington.

APPENDIX A

DESCRIPTION OF WORK
241-A TANK FARM DIRECT PUSH VADOSE CHARACTERIZATION
FY 2018/2019, REV. 2

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SNC·LAVALIN ATKINS

241-A TANK FARM DIRECT PUSH VADOSE CHARACTERIZATION FY 2018/2019

DESCRIPTION OF WORK

Project Number: 5166670

Contract Number: 65210/008-009
DRCM Reference: N/A

IDV

Print Name	N/A
Sign / Date	N/A
	QL-3

Rev	Date	Revision Status	Originator	Checker	Approver
0	5/14/18	Issue	M. Gardner	R. Steffler	M. Gardner
1	1/3/19	Revised	M. Gardner	R. Steffler	P. Cavanah
2	6/10/19	Revised	M. Gardner	R. Steffler	P. Cavanah

ENG-03.18-1 R8

History Sheet

Rev	Reason for Revision	Originator
0	Issue	M. Gardner
1	Add language to address push tubing integrity and NCR corrective actions (ET-NCR-DRIL-18-001)	M. Gardner
2	Revise Section 2.2.1 to reflect new design for Electrical Resistivity Tomography Probe Installation. Update Tables 2.2 and 2.3 for Borehole #C9387/C9386 due to relocation.	M. Gardner

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ABBREVIATIONS AND ACRONYMS

Atkins	Atkins Energy Federal EPC, Inc.
BGO	Bismuth Germinate Oxide
bgs	below ground surface
CeBr3	Cerium Bromide
DOE	U.S. Department of Energy
DOW	Description of Work
DQO	Data Quality Objectives
Ecology	State of Washington, Department of Ecology
ERT	Electrical Resistivity Tomography
ES&H	Environmental, Safety, and Health
FY	Fiscal Year
GHA	General Hazards Analysis
GPR	Ground Penetrating Radar
GPS	Global Positioning System
ID	Inside Diameter
ISMS	Integrated Safety Management System
OD	Outside Diameter
RCRA	Resource Conservation and Recovery Act
RPP	River Protection Project
SAP	Sampling and Analysis Plan
SGE	Surface Geophysical Exploration
SJHA	Standing Job Hazard Analysis
SST	Single-Shell Tank
WAC	Washington State Administrative Code
WMA	Waste Management Area
WRPS	Washington River Protection Solutions, LLC

1.0 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Atkins Energy Federal EPC, Inc. (Atkins) is tasked with conducting vadose investigations within the 241-A Tank Farm (A-Farm). This Description of Work (DOW) focuses on the planned characterization efforts at A-Farm. The overall objective of this effort is for characterizing the geology in and around the Tank Farms and optimizing the installation of deep electrodes for electrical resistivity imaging.

This DOW provides the work instructions for conducting characterization and sampling efforts for direct push soil investigation in A -Farm as described in RPP-PLAN-62041, *Sampling and Analysis Plan for Waste Management Area A-AX Focus Area 1 (241-A-104 and 241-A-105)* and summarized in Table 1-1. 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; attending meetings and planning sessions; and providing a written report documenting field activities and data collection at the conclusion of the work.

Table 1-1. Description of Work

Drilling Method	No. of Sites	Vertical or Angle	Completion Depth (ft.)	No. and Type of Soil Samples	Geophysical Logging
Direct Push	5	1 Vertical 4 Angle	127 ft - 285 ft	~50 split spoon soil samples	Gyrometer, Gross Gamma, Spectral Gamma, Neutron-Moisture, and Temperature

1.2 BACKGROUND

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 waste would gravity-flow to the tanks.

The U.S. Department of Energy (DOE) assigned the River Protection Project (RPP) Single-Shell Tank Program the tasks of transferring waste from the single-shell tanks (SST) to double-shell tanks and developing and implementing a strategy to retrieve SST and miscellaneous underground storage tank waste. WRPS was given responsibility for collecting and providing subsurface data from the SST farm facilities. This contributes to preparation for the retrieval of the tank waste. The intent of the 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.

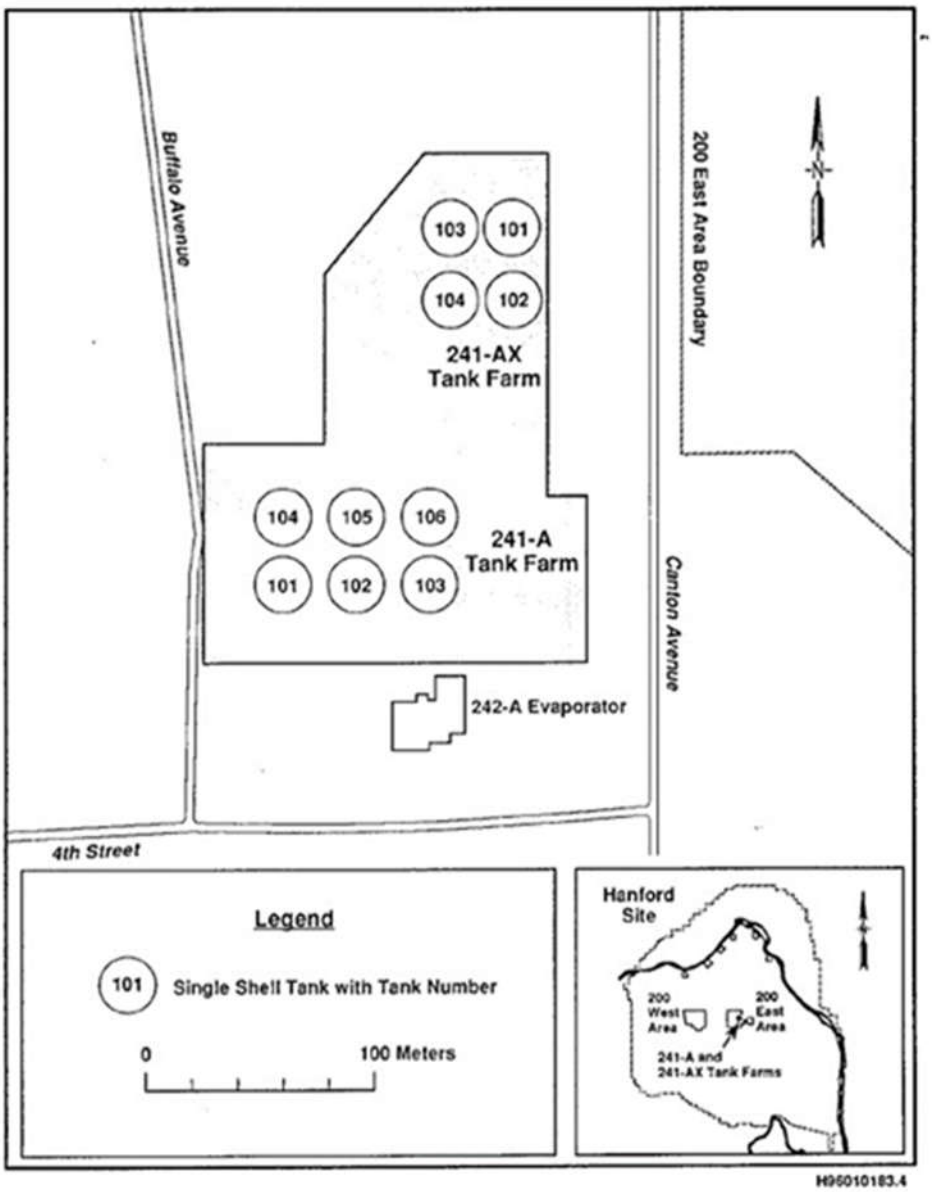
This plan documents the sampling and analysis activities that will be conducted for exploration boreholes used to characterize and evaluate the vadose zone in the A Farm as well as the adjacent sampling boreholes. Near-surface soils at the A farm may be contaminated from past

waste releases. Data obtained from the analysis of the geophysical well logs, the soil samples, and the emplaced electrical resistivity probes in these boreholes, will help to determine the geographic extent of vadose contamination at the A Farm.

1.3 A TANK FARM BACKGROUND

The A-Farm is part of the A-AX Waste Management Area (WMA), which encompasses two Tank Farms (A and AX) containing a total of ten tanks (tanks A-101 through A-106, and tanks AX 101 through AX-104) located in the east central portion of the 200 East Area (Figure 1-1).

Figure 1-1. 241-A and 241-AX Tank Farm Location Map



The A-Farm was constructed in 1955. Each tank is 75-ft diameter and 30-ft deep with a capacity of one million gallons. The tanks were connected by overflow lines but did not cascade. The tanks were underlain by laterals connected to caissons as a leak detection system because the Tank Farm was designed to store boiling waste. The tanks in A Farm received waste generated by essentially all the major chemical processing operations that occurred at Hanford including bismuth phosphate fuel processing, uranium recovery, plutonium-uranium extraction plant fuel processing, fission product recovery, and Tank Farm interim stabilization and isolation activities.

1.4 GEOLOGICAL SETTING

The tanks in WMA A-AX were constructed in excavations into the near-surface sediments that overlie the Columbia River Basalt Group. The Columbia River basalt forms the basement bedrock. From oldest to youngest, these deposits include the following:

- Columbia River Basalt Group
- Undifferentiated Plio-Pleistocene silt and gravels
- Hanford Formation – lower gravelly sequence (H3 subunit)
- 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 sub-unit)
- Recent deposits and/or backfill.

The thickness of the vadose zone, comprising the formations from ground surface to top of ground water is about 295-ft in the A-Farm. The unconfined aquifer lies mostly within the undifferentiated Plio-Pleistocene silt and gravels.

2.0 WORK SCOPE

This DOW addresses five push sites located in A-Farm. Planned locations and specific strategy for each push location is provided in RPP-RPT-60227, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area A-AX* (DQO), and RPP-PLAN-62041, Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105 (SAP). These sites are shown in Figure 2-1, *Direct Push Location Map, Tanks A-104 and A-105*. Table 2-1, *Direct Push Location Strategy for WMA A-AX Focus Area 1, Tanks A-104 and A-105* provides the specific strategy for each push location.

Figure 2-1. Direct Push Location Map, Tanks A-104 and A-105

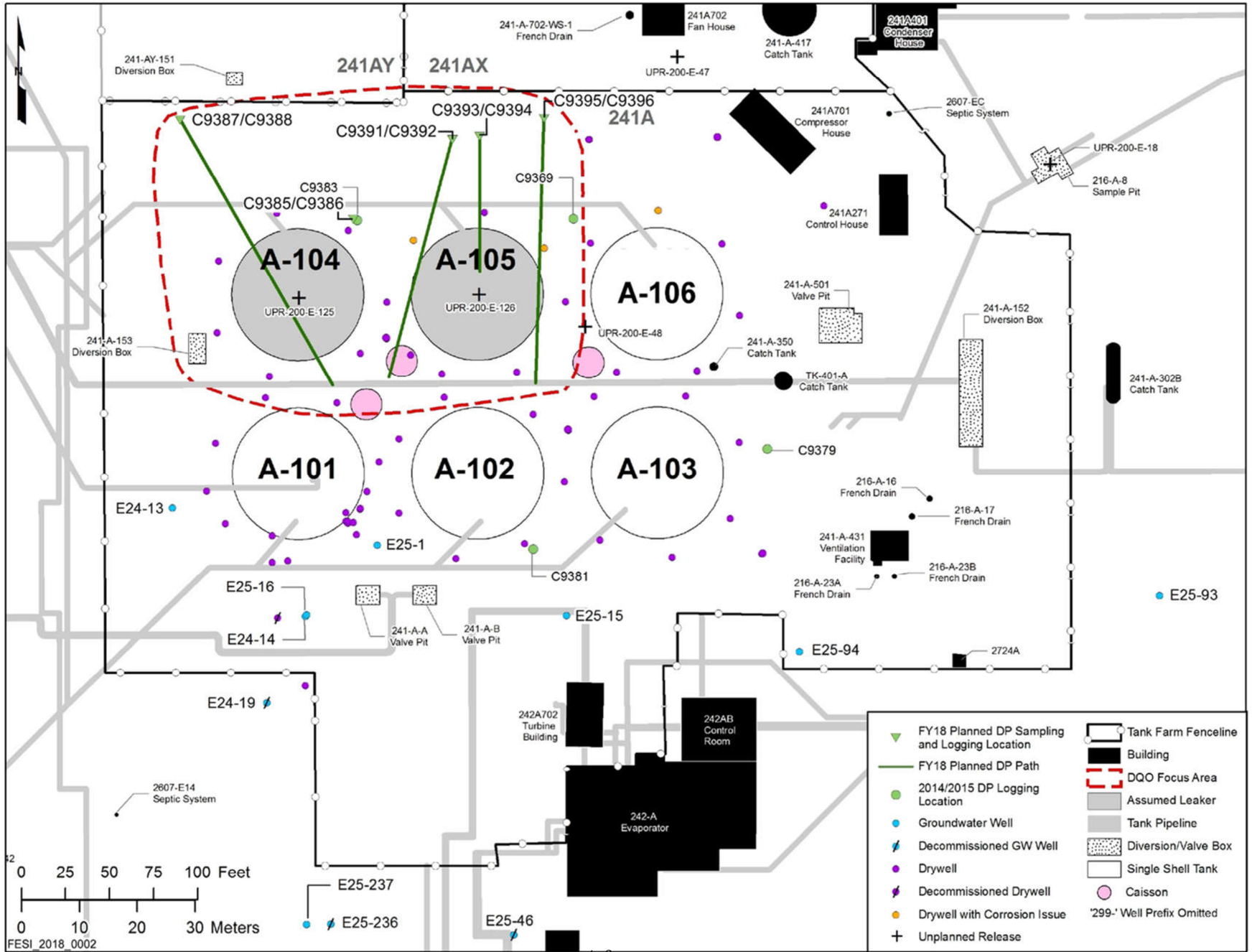


Table 2-1. Direct Push Location Strategy for WMA A-AX Focus Area 1, Tanks A-104 and A-105

Location # (DQO Designation)	Borehole ID	Approximate Location	Input Factors Associated with Location Reason for Sampling	Target Depth (bgs)[1]	Angle[2]	Pipe Run	Minimum Distance from Tank
[1] below ground surface (bgs). [2] Angle is defined as degrees from vertical (i.e., 90 degrees minus dip).							
1	C9387/C9388	Northwest of TankA-104 (Angle push going southeast and directly under the tank)	• Tank A-104 designated as a leaker (~2,000 gallons) • Possible leak location area • Higher temperature and gross gamma readings in laterals (14-04-01 and 14-04-02) • Higher temperature and gross gamma readings in drywells (10-04-04 and 10-04-05) • Higher SGE conductivity area **Assess Tank A-104 - magnitude and pathway of contamination for modeling, risk, and nature and extent.**	241.35 ft	35	278.69 ft	28 ft
2	C9385/C9386	North and between Tanks A-104 and A-105 (Vertical push)	• Tanks A-104 and A-105 designated as a leaker (~2,000 gallons and ~2,000 to 40,000 gallons, respectively) • Direct push log at Location C9383, temperature of ~120 ºF, ~50 ft bgs • Possible location for deep push ~285 ft bgs **Assess Tanks A-104 and A-105 - magnitude and pathway of contamination for modeling, risk, and nature and extent.**	285 ft	None	285 ft	54 ft

Location # (DQO Designation)	Borehole ID	Approximate Location	Input Factors Associated with Location Reason for Sampling	Target Depth (bgs)[1]	Angle[2]	Pipe Run	Minimum Distance from Tank
[1] below ground surface (bgs). [2] Angle is defined as degrees from vertical (i.e., 90 degrees minus dip).							
3	C9391/C9392	North of Tank A-105 (Angle push towards southwest side of tank	• Tanks A-104 and A-105 designated as a leaker (~2,000 gallons and ~2,000 to 40,000 gallons, respectively) • Possible leak location area • Higher temperature and gross gamma readings in laterals (14-05-01,14-05-02, and 14-05-03 • Higher temperature readings in drywells (10-05-09, 10-04-04 and 10-04-05) • Drywell 10-05-10 indicated casing corrosion (~ 64 ft bgs) • Higher SGE conductivity area **Assess Tanks A-105 and A-104 - magnitude and pathway of contamination for modeling, risk, and nature and extent.**	241 ft	30	279 ft	27 ft

Location # (DQO Designation)	Borehole ID	Approximate Location	Input Factors Associated with Location Reason for Sampling	Target Depth (bgs)[1]	Angle[2]	Pipe Run	Minimum Distance from Tank
[1] below ground surface (bgs). [2] Angle is defined as degrees from vertical (i.e., 90 degrees minus dip).							
4	C9395/C9396	Northeast of Tank A-105 (Angle push going south and under the east-side of tank)	• Tank A-105 designated as a leaker (~2,000 to 40,000 gallons) • Possible leak location area • Higher temperature and gross gamma readings in laterals (14-05-01,14-05-02, and 14-05-03) • Higher temperature readings in drywell (10-05-05) • Drywell 10-05-02 indicated casing corrosion (~ 64 ft bgs) **Assess Tank A-105 - magnitude and pathway of contamination for modeling, risk, and nature and extent.**	139 ft	45	197 ft	12 ft
5	C9393/C9394	North of Tank A-105 (Angle push going under the north side of tank	• Tank A-105 designated as a leaker (~2,000 to 40,000 gallons) • Higher temperature and gross gamma readings in laterals (14-05-01,14-05-02, and 14-05-03) • Corrosion observed at drywells 10-05-02 and 10-05-10 **Assess Tank A-105 - magnitude and pathway of contamination for modeling, risk, and nature and extent.**	285 ft	15	295 ft	31 ft

Table 2-1 was excerpted from the SAP. During the development of the SAP, the values for direct push target depths, angles, pipe run lengths, and distances from the tank identified in Table 2-1 were modified from those identified in the DQO Report to accommodate existing infrastructure and planned retrieval program needs. Data from these modified direct pushes will meet the objectives identified for this focus area. Further modifications may be required after field walk downs are conducted, during work package development, and/or if an obstruction occurs during pushing. Changes in direct push locations will require notification and approval of the WRPS Project Manager or designee. If a borehole meets refusal prior to achieving total depth, Atkins will temporarily suspend work and will contact the WRPS Technical Lead. The WRPS Technical Lead will determine the appropriate path forward. All changes/modifications to the planned scope will be documented in the final Completion Report.

For the A-Farm characterization activities, Atkins will utilize direct push technology for borehole installations. The WRPS Technical Lead will determine the sequence for push location selection. An initial exploration borehole will be pushed at a pre-selected location and geophysical logging conducted. Analysis of the geophysical logs will provide sample picks for an adjacent sampling push borehole. At the direction of WRPS, subsurface electrical resistivity tomography (ERT) assemblies may be placed in the exploration borehole, and the borehole completed in accordance with the State of Washington, Department of Ecology (Ecology) required well applications, the Washington State Administrative Code (WAC) 173-160, *Minimum Standards for Construction and Maintenance of Wells*.

2.1 BOREHOLE PLACEMENT

The method selected to construct the boreholes 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 2.5, “Location of Boreholes”. 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.

A total of 5 push locations are planned, with one Exploratory and one Sampling borehole to be pushed at each location. Four of the locations will have angled boreholes pushed and one location will have vertical boreholes pushed. Borehole coordinates are provided in Table 2-2. Planned borehole trajectories (including Azimuths, Dip angles, depths, pipe runs and horizontal distances) are provided in

Table 2-3.

Table 2-2. A-Farm Borehole Coordinates

Borehole #	Easting	Northing	Elevation
C9385/C9386	575332.62	136087.015	210.87
C9387/C9388	575305.04	136097.04	211.02
C9391/C9392	575349.04	136102.45	210.63
C9393/C9394	575355.23	136102.515	210.58

C9395/C9396	575363.23	136104.44	210.52

Table 2-3. A-Farm Borehole Trajectories

Borehole #	Azimuth (degrees from true North)	Dip Angle (from Vertical)	Target Depth (ft bgs)	Pipe Run (ft)	Horizontal Distance (ft)
C9385/C9386	0	90	285.25	285.25	0
C9387/C9388	150	55	242.00	295.00	169.25
C9391/C9392	195	60	241.35	278.69	139.34
C9393/C9394	180	75	285.03	295.08	76.37
C9395/C9396	180	45	139.10	196.72	139.10

NOTE: Exploration boreholes are identified with an odd number (i.e., C9385) and the sampling boreholes are identified with an even number (i.e., C9386).

2.2 EXPLORATION BOREHOLES

Exploration boreholes are identified with an odd number (i.e., C9385).

The exploratory activities will be initiated by placement of a single tubing string that is 2.5-in. outside diameter (OD) x 1.75-in. inside diameter (ID) (e.g., the exploratory borehole). This tubing is advanced to the target depth or refusal. Target depths are provided in

Table 2-3. Geophysical logging will then be conducted in this borehole within the push tubing. 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 cerium bromide and bismuth germinate oxide ($CeBr_3$/BGO) for gross gamma and spectral gamma analysis, a neutron-neutron detector for moisture, and an infrared casing temperature device.

The logging data is reviewed by WRPS and Atkins technical personnel to determine targets for sample collections to be taken from separate pushes located approximately 2-3 ft from the exploration boreholes. Should it be determined by WRPS that further use of the exploration borehole is not required, it will be decommissioned per applicable WAC 173-160 requirements (e.g., filled with bentonite or bentonite/cement grout as required) as the push tubing is extracted.

2.2.1 Electrical Resistivity Tomography Probe Installation

At the direction of WRPS, Electrical Resistivity Tomography (ERT) equipment may be installed in the exploration boreholes as part of the borehole decommissioning process. Multi level resistivity probes have previously been installed at the DOE Hanford Tank Farms during the decommissioning of the boreholes, or as Resource Protection Wells when installed with wetting tubes for keeping the electrodes wetted. Due to a continued effort to improve the performance of the equipment for collecting consistent, reliable and useful data, the design for the installation

and materials has been modified. These newly designed ERT assemblies consist of a cable with multiple stainless-steel mesh electrodes spaced at a predetermined distance. The specific design for the 241-A Tank Farm Focus Area 1 ERT installations has 32 equally spaced electrodes along the cable. Each electrode is 12 inches in length. Specifics for the ERT assemblies for each exploratory borehole where installations are planned are provided in Table 2-4.

Table 2-4. ERT Specification by Borehole

Borehole ID	Borehole Total Depth (ft. of angled pipe run)	Cable length (feet)		Electrode Spacing (feet)	Total of Electrodes
		Overall	Lead in		
C9387	295	305	26	9	32
C9391	278.7	289	25.5	8.5	32
C9393	295.1	305	26	9	32
C9395	196.8	207	19	6	32

A custom grout mixture has been developed to provide high-strength, low-permeability, and low conductivity. This grout mixture consists of a blend of 32% Type 1 Portland Cement, 68% DS-325 Hess Pozzolan (ground Pumice) with an approximate 0.55 water to grout ratio. This custom grout mixture has been approved by the Washington Department of Ecology for use in these ERT installations.

The installation process will be as follows:

1. The expendable drive tip for the direct push tubing will be knocked out at total depth.
2. The drive casing will be pulled back approximately 1-2 feet. The distance back-pulled will depend on ERT placement requirements, the experience of the driller and the competency of the formation.
3. The borehole specific ERT assembly will be lowered down the drive tubing, out the tip holder and positioned based on pre-set electrode locations. A poly tremie tube will be attached to the ERT assembly as it is placed. A coiled fiberglass rod will be used to assist in lowering and positioning the assembly. (Note: A weight may be attached to bottom of ERT to assist in installation and maintaining positioning).
4. Once the assembly with the attached tremie tube is in position, the coiled fiberglass rod will be removed.
5. Approximately 20 to 30 ft. of drive tubing will then be extracted, taking care to ensure the ERT assembly and tremie tube remain in position.

6. The custom grout mixture will be pre-mixed and ready to be pumped. The grout mixture will be placed from the bottom up by pumping a calculated volume thru the tremie tubing, ensuring the grout mixture remains below the drive tubing tip holder.
7. The tremie tubing will be extracted to 2-3 ft. below the bottom of the tip holder and flushed with approximately 1 tubing volume of water.
8. Repeat steps 5 thru 7 until the grout mixture is brought to ground surface.
9. Should the grouting process extend over multiple work shifts, or an extended pause in activities occurs, ensure the tremie tubing and drive tubing is flushed with water and both are back-pulled approximately 20 ft from top of grout level in the borehole to ensure tubing strings do not become cemented-in between lifts.
10. Grout volumes, water additions, footages, and durations for each grout lift shall be recorded.

The ERT installation and grouting process, including length of lifts, may be modified by the Driller or at the direction of the WRPS Technical Lead as necessary to ensure proper installation. Factors that may influence the process include but are not limited to stability of the borehole as the drive tubing is extracted, weather, Tank Farm Operations, and equipment.

Cement seals and surface protection will be placed to protect the ERT wire leads at ground surface. The installation process and materials used may be modified at the direction of WRPS.

By approved Variance with Ecology, these boreholes with the ERT assemblies grouted in place are considered decommissioned boreholes in accordance with WAC-173-160-460. When determined to no longer be needed, the ERT leads will be cut off at or below ground surface.

2.3 SAMPLE BOREHOLE

Sampling boreholes are identified with an even number (i.e., C9386). A second borehole adjacent to the exploratory borehole will be driven for collecting soil samples. The exact location and global positioning system (GPS) coordinates of this sample borehole will be determined by WRPS. Sampling is conducted with outer push tubing that is 2.625-in. OD x 1.875 in. ID and inner tubing that is 1.5-in. OD x 1.0-in. ID. The dual wall system with a “dummy” tip is advanced to the predetermined sample depth. When the targeted sampling depth is achieved, the entire tubing string (inner and outer casing) is back-pulled between 2- to 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 1.25 in. OD x 1.08 in. ID. After the sampler is advanced approximately 2 ft, the entire tubing string (inner and outer casing) is again back-pulled between 2- to 5-in. to relieve pressure, and the inner string is released and retrieved to surface. The liners are removed from the sampler body and surveyed.

If opening of the retrieved sampler would result in more than the allowable dose rates permitted by the Radiation Work Permit, the sampler will be placed in a transportation container and opened under controlled conditions at the designated laboratory, or as directed by the Radiation Control organization. Otherwise, trained WRPS sampling personnel document recovery, sample condition, and volume recovery percent; then the samples are packaged and transported to the

selected laboratory for analysis in accordance with approved procedures. The samples will be analyzed on a “quick-turnaround” basis for moisture content, nitrate, technetium, pH, and conductivity.

After the samples are retrieved, 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 in accordance with WAC 173-160 requirements.

2.4 PLACEMENT OF ANGLE BOREHOLES

Four of the five planned push locations will require angle pushes. Table 2-2 and

Table 2-3 provide the coordinates, angles, azimuths, target depths and pipe runs for each angle push. For an angle borehole, the borehole location will be staked by use of GPS equipment and verified by a licensed land surveyor. The designated bearing azimuth from true north will be staked for the borehole. A 3 ft x 3.5 ft plate with the required angled footplate stop will be placed to act as a guide device to control the angle of the borehole as it is advanced. It is secured to the ground by driving 2.5-in. diameter casing 4.5 ft into the ground at each corner. The alignment of the plate to the designated bearing, and the leveling of the plate, will be completed and verified before the plate is secured and tubing is driven. If any unusual or unexpected activities are identified during the push or anchoring of the plate, work will stop until the discovery can be properly evaluated.

When the angle casing has been driven a run length of 45 ft into the ground, a gyroscope survey will be performed and results reviewed by Atkins and WRPS before borehole advancement is resumed. Continuation of borehole advancement must be authorized by WRPS. Additional gyroscope surveys at specified intervals and total depth (TD) of the borehole will be conducted as directed by the WRPS Project Manager. Refer to Section 3.2 for additional information on the gyroscope survey.

Upon conclusion of the exploration borehole logging and placement of resistivity electrodes, the surface plate will be moved approximately 2-3 ft off the site of the first borehole (as directed by WRPS) and re-staked to the ground. The plate will be moved until it is parallel to the original azimuth direction of the exploration borehole, as provided in

Table 2-3, and the sample borehole will be driven.

2.5 LOCATION OF BOREHOLES

Borehole locations were selected through an iterative process using ground penetrating radar (GPR), electrical ground scans, site walk downs, and a review of as-built infrastructure drawings. The final coordinates of the selected sites were then plotted with computer-aided drafting. The borehole location will be staked by use of GPS equipment and verified by a licensed land surveyor.

As previously discussed, **Table 2-1** provides the direct push location strategy; the location number (DQO designation), borehole identification, approximate location, input factors associated with the identified location and the reason for sampling, target depth (bgs), angle in degrees from vertical, pipe run, and minimum distance from tank. This information is provided

as a guidance in the DQO and is subject to change based on field conditions and final directions by the WRPS Technical Lead.

Table 2-2 contains the direct push borehole coordinates and borehole numbers (Well ID's) assigned by the Hanford Site Well Coordinator for the A-Farm direct push activities discussed in this DOW.

All exploratory and sampling push location activities are tracked and documented on Field Activity Reports by referencing the borehole number as provided in Table 2-2, or assigned during progress of the work. When sample collection is attempted, a unique borehole number will be used to track the push location on the Field Activity Report. The identification for a sample borehole is one number greater than the corresponding exploration borehole (e.g., if a zone or zones of interest are identified at exploration borehole C9395, the borehole number of the subsequent sampling push is C9396. The sample will be identified using the borehole number on the sample label and the shipping documentation.

Both the exploration and sampling borehole Well ID's and locations are assigned by the Hanford Site Well Coordinator and will be tracked and documented on the Field Activity Reports. In addition to the location, the push borehole depth, sample depths, geophysical log data, and other pertinent information derived during the activity (e.g., depth of contamination as identified from geophysical log interpretation or the degree of contamination observed on push rods during extraction) is included in the Field Activity Reports.

3.0 WORK TASKS

3.1 SITE SETUP

The push equipment will be mobilized, and a controlled work area will be set up surrounding the preselected and marked location. A radiological pre-survey of the direct push rig and equipment will be conducted (per WRPS procedure) prior to moving the equipment into the work zone. As noted above, ground-penetrating radar scans and as-built drawing reviews and comparisons have been completed to properly select the borehole locations. The equipment consists of a track-mounted mobile unit with a hydraulically powered rotational 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 borehole locations. Tank Farm personnel will provide support as necessary, for guiding the equipment onto location and for subsequent movement of the unit to the listed borehole locations.

WRPS Radiological Control Technicians, Nuclear Chemical Operators, and Industrial Hygiene Technicians will be onsite to support work activities. Contamination control measures will consist of laying spill protection material beneath the equipment. Spill protection consists of placement of felt and plastic sheeting below and around the direct push unit when necessary and prudent. This spill protection also aids in controlling radiation contamination exposure to the direct push equipment. Control of the work area and control of potential contamination are aided by restricting site entries from non-essential 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

All activities using the hammer unit will conform to the manufacturer's operating manual, 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 boreholes, the onsite Health Physics Technician will monitor for radiological contamination. WRPS Tank Farm Qualified Nuclear Chemical Operators will perform any decontamination required.

During advancement of the boreholes, casing (push rods) will be driven into the subsurface by use of the hydraulic hammer impact system. The borehole 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 push rod advancement indicates that obstructions are present, push advance will stop, the direct push equipment and work area will be placed in safe condition, and the WRPS 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 determined by trained operators of the direct push equipment (refusal is defined as a minimum of 1-in. of advance per minute of impact operations), the length of tubing driven will be noted in the Field Activity Report and the WRPS Technical Lead will be contacted for further instructions.

3.2.1 Angles Push Trajectory Verification

During pushing activities on angle drives, a gyroscope will be used to verify that the tubing is on the planned trajectory. Based on previous experience, one intermediate depth location has been identified to verify this trajectory. After the casing is driven to a depth of 45 ft bgs (vertical pipe run will be longer for angle borehole), a gyroscope run will be performed, and results reviewed by the Atkins and WRPS Technical Leads before advancing the borehole.

Table 3-1 provides the three-dimensional location (xyz - northing, easting, and mean sea level elevation) of the center path of the tubing for the angle exploration boreholes in the A Tank Farm.

The three-dimensional locations (xyz) of the center path of the tubing for the sample boreholes will be the same as their paired exploratory boreholes or as otherwise determined by the WRPS Technical Lead following completion of the exploration boreholes.

The data will be plotted and reviewed at each location to confirm that the center point of the tubing path is within a 2.5 ft (0.76 m) radius of the three-dimensional locations (xyz) listed in

Table 3-1, and before the borehole can be advanced. The WRPS Technical Lead will provide the final decision for advancement of the borehole beyond the data collection point listed. If the data indicates that the borehole path is not within the 2.5 ft radius but is not directed toward the tank, the WRPS Technical Lead may direct that the borehole be advanced. A final gyroscope run will be conducted at total depth to plot the trajectory of the entire borehole to provide spatial data for samples collected. Additional gyroscope runs may be conducted at specified intervals as directed by the WRPS Technical Lead.

The angle borehole will be advanced approximately 0.8 ft past the pipe run lengths noted in the fourth column of

Table 3-1 before a gyroscope run is performed. The additional length is necessary to allow for the gyroscope tool inside the casing to be at the midpoint of the gyroscope itself, and at the

desired distance for data collection points in the pipe run lengths noted above. The last column of

Table 3-1 shows the actual measured pipe length that must be pushed for the gyroscope survey in the borehole.

NOTE: Total depth/pipe run for both the exploration and sampling boreholes may be altered based on decisions and direction provided by WRPS Technical Lead. These changes will be documented in the Work Package, in the Field Activity Report and in the Completion Report.

Table 3-1. Gyroscope Data Collection Points for Exploratory Boreholes

Well ID	Northing	Easting	Elevation (msl) m	Data collection point length from surface	Total pipe length from surface
C9387	136097.04	575305.04	210.94 m (692.09 ft)	-0-surface	N/A
	136088.73	575309.84	197.22 m (647.08 ft)	13.72 m (45.0 ft)	**16.74 m (54.93 ft)**
	136052.34	575330.85	137.22 m (450.21 ft)	73.72m (241.88 ft)	90 m (295.28 ft)
C9391	136102.45	575349.04	210.63 m (691.04 ft)	-0-surface	N/A
	136094.87	575346.8	196.91 m (645.61 ft)	13.72 m (45.0 ft)	**15.84 m (51.93 ft)**
	136061.51	575337.65	137.14 m (449.64 ft)	73.612 m (241.35 ft)	85 m (278.69 ft)
C9393	136102.52	575355.23	210.58 m (690.43 ft)	-0-surface	N/A
	136098.97	575355.23	196.86 m (645.44 ft)	13.72 m (45.0 ft)	**14.20 m (46.56 ft)**
	136079.19	575354.87	123.64 m (405.38 ft)	86.93 m (285.03 ft)	90 m (295.08 ft)
C9395	136104.44	575363.23	210.52 m (690.23 ft)	-0-surface	N/A
	136090.86	575363.07	196.8 m (645.26 ft)	13.72 m (45.0 ft)	**19.40 m (63.62 ft)**
	136062	575362.86	168.15 m (551.31 ft)	42.43 m (139.10 ft)	60 m (196.72 ft)

Assuming a straight push, the boreholes will pass the tank footing by a calculated margin of 9 ft (2.74 m). The required minimum safety margin to allow the probe to continue past the tank footer is 5 ft (1.52 m) of clearance.

3.2.2 Push Tubing Integrity Verification

Prior to use for each push hole, all push tubing and tooling will be visually inspected for defects; such as cracks at the tool joints, burrs or deformation of the threads or other heavy rust or grease buildup on the threads. If defects are found that render the tooling unacceptable or risky for use, the item(s) will be segregated and disposed. When appropriate, items will be repaired or cleaned in a manner making them acceptable for use (e.g.; file off burrs, clean with solvent or approved cleaner, remove rust on threads, etc.).

Push tubing in use will be rotated between push holes to result in a reversal of the sequence in which they were last run. Number of runs for each tubing string (push rods used on a single push hole) will be documented. Each tubing string will be segregated in individual pipe racks and documentation on use maintained. The maximum number of runs for a given tubing string will be established by the WRPS Technical Lead.

During driving operations, inspection of the internal surfaces of the push tubing, focusing on the tool joints, will be conducted using a borehole camera. These inspections will be performed prior to running any tooling down the tubing, specifically prior to conducting gyro surveys or geophysical logging. Camera surveys may also be conducted at the discretion of the rig operator or the WRPS Technical Lead at any point during the driving operations. The purpose of the camera surveys is to identify any deformations of the tubing, debris or separation/breaks at the tool joints and to visually determine any areas within the casing where restrictions may cause the gyro or logging tools to hang up or become stuck. Should a condition be observed that is determined to present a risk to running tools in the tubing, The WRPS and Atkins Technical Leads will evaluate options and make a decision as to a path forward.

If during push operations it is determined that the push tubing has parted and no further activities are planned to be conducted (e.g.; sampling, logging, resistivity probe installation, etc.), the borehole condition will be reported to the Ecology. Upon evaluation of the borehole conditions and with discussions with Ecology, the WRPS Technical Lead and Atkins personnel; a determination will be made as to whether to attempt to retrieve the parted tubing or to decommission in place. Decommissioning will be conducted in accordance with WAC 173-160 requirements.

3.3 GEOPHYSICAL LOGGING

At refusal or target depth of the exploration borehole, Atkins will conduct logging operations to gather geophysical information. These geophysical investigations will be conducted in conformance with Atkins procedure, AE-FO-PR-001, *Geophysical Logging*. Logging parameters may change and/or log suites may be added or deleted based on technical needs of the WRPS project, as determined by the WRPS Technical Lead. The following logging suites are currently planned:

1. Ce_3Br/BGO @ 100 seconds/0.5 ft.
2. Neutron-neutron detector with a client-provided (i.e., WRPS) Americium Beryllium source for moisture logging @ 15 seconds/0.25 ft.
3. Temperature logging with an infrared sensor that continuously records borehole wall temperature as the instrument moves up the borehole.

Logging data will be collected from the total depth of the borehole to the surface. The logging analyst, Atkins personnel, and the WRPS Technical Lead will review the field log data to determine the number and location of samples to be collected. The log data will be processed,

and field plots will be generated to permit selection of sampling intervals. A completion report with the processed and analyzed log data will then be generated.

3.4 SAMPLING

After review of the geophysical logging data, and after the sampling zones have been selected, the push equipment will be relocated approximately 2-3 ft away from the exploration borehole and the sampling will be performed. An initial surface sample will be collected. The sampling borehole will be pushed as described in Section 2.3.

3.4.1 Quality Control Samples

Field duplicates for surface samples, field equipment rinsate blanks, and field blanks will be required to be collected per the SAP. The collection of these quality control samples is the responsibility of WRPS.

3.5 CLEANING

The WAC 173-160-440 states that, "When drilling in known or potential areas of contamination, steam clean the drill rig derrick and all drilling equipment on site before and after well construction. If the equipment is used to drill in radioactive areas, you must develop a decontamination plan and the department must approve that plan prior to the equipment being removed from the drill site." Additionally, WAC 173-160-440 states, "All well construction materials to include casing, screen(s), and filter pack material must be free of contaminants prior to installation." Cleaning of direct push equipment and tooling will be performed in accordance with these requirements and the approved variance request submitted to Ecology. This variance provides the following process and background information regarding equipment cleaning and decontamination on the Hanford Site.

Prior to moving the equipment onto the site, the equipment used for push advance purposes (e.g., drill rig, push rods, tips, etc.) will be high temperature / high-pressure washed using an approved non-phosphate cleaner. After the push activity, if it is not possible to remove the push equipment from the Tank Farm for cleaning in a potentially radiologically contaminated area; Ecology has granted a variance to allow for hand cleaning and wiping of the rods to meet WAC cleaning requirements. Thus, after the push activities, the equipment will be radiologically surveyed and be visibly free of dirt, grease, and other possible contamination which would potentially provide for cross-contamination of retrieved samples.

The radiological survey and release is conducted under the WRPS Radiological Program and in accordance with a Release Plan written by the WRPS radiological organization. At this time, due to current radiation survey methodologies and release criteria, a "free" release (release of equipment that has been surveyed and found free of radiological contamination) cannot be given for tubular goods (e.g., drill pipe, push tubing, etc.) as the interior surfaces of the tubular goods cannot be surveyed directly. Therefore, these tubular goods are designated as "potentially radiologically contaminated".

There is currently no facility at Hanford where steam cleaning of potentially radiologically contaminated materials can be performed. Under current radiation control requirements at the Hanford Site, the tubular goods can be bagged and transported out of a Tank Farm but must remain within the confines of the Hanford Site, as "potentially radiologically contaminated" materials, and must be handled and stored in accordance with radiation control procedures. The radiological controlled tubular goods may be reused for investigation within other Hanford Tank Farms following field cleaning.

The field cleaning involves wiping down the exterior and interior of the tubing using a cleaning agent (e.g., Simple Green®). A Variance to WAC-173-160-440 has been approved by Ecology to provide an exemption from the requirement to steam clean the non-releasable tubular goods prior to re-use within a radiological contaminated area.

Quality control requires that all sampling equipment (e.g., sample liners, sample caps) used for the performance of sampling activities will be cleaned using U.S. Environmental Protection Agency guidelines/specifications as referenced in the *Resource Conservation and Recovery*

Act (RCRA) and the WAC. Cleaning of samplers, liners, etc., is the responsibility of the 222S Laboratory personnel. WRPS Nuclear Chemical Operators will transport the clean sampling equipment to the job site.

After being cleaned, the equipment will be protected from unwanted 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 documented by use of cleaning certification documentation.

3.6 REGULATORY REQUIREMENTS

The boreholes constructed during the scope of this work are regulated by WAC 173-160. Documentation required to meet this regulation includes:

- Notice of Intent to Construct a Soil Boring or Soil Sampling or Vapor Sampling Well (Start Card)
- Notice of Intent to Construct a Resource Protection Well
- Notice of Intent to Decommission a Well
- Resource Protection Well Reports
- Variance Request Documentation
- Decontamination Plan

This documentation is submitted to Ecology and included in the field work completion report. Each exploratory borehole and sampling borehole will be filled with bentonite, a bentonite slurry, and/or grout (neat cement or cement-bentonite mixture) as the push tubing is extracted. At the direction of WRPS, subsurface resistivity probes may be placed in the exploratory boreholes. Placement of the resistivity instrumentation and the type of completion materials used will be documented on the daily Field Activity Report and Resource Protection Well Reports.

4.0 ENVIRONMENTAL, SAFETY, AND HEALTH PROGRAM

The primary concern for Atkins and WRPS is the safety of personnel assigned to perform activities related to the A Tank Farm work. WRPS has provided a comprehensive list of DOE, WRPS, and Hanford Site-specific requirements and procedures for conducting work within the confines of the A Tank Farm. While executing the work scope detailed in this DOW, Atkins will comply with all applicable directives and orders (requirements) from the resulting DOE, WRPS, and Hanford Site procedures. These specific requirements and procedures are provided in the applicable WRPS work package prepared for this work scope.

4.1 INTEGRATED SAFETY MANAGEMENT SYSTEM

Atkins subscribes to the Integrated Safety Management System (ISMS) and implements an ISMS approach into all work tasks (AE-SH-PO-0002, *Integrated Safety Management Policy*). These requirements flow down, not only internally to Atkins employees, but also to Atkins 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*
- Atkins safety and health standards, procedures, and permits
- Atkins generated Job Hazard Analysis specific procedures for safe operation of Direct Push equipment

4.1.1 Integrated Safety Management System Core Functions

The 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 Atkins 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 HAZARDS ANALYSIS

WRPS has prepared the *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, Atkins has coordinated with WRPS Industrial Hygiene and Safety oversight to prepare SJHA-0080, *Standing Job Hazard Analysis for Vadose Direct Push Activities,* located inside/around WRPS Tank Farms, which encompasses the hydraulic hammer unit direct push activities to be conducted during this scope of work. Atkins personnel performing these activities have been provided the appropriate training and instruction to mitigate the hazards associated with the identified activities. The requirements of the WRPS GHA and SJHA are communicated to everyone associated with the project, including visitors.

4.3 SAFETY AND HEALTH COMPLIANCE OVERSITE

Both Atkins Safety personnel and WRPS Tank Farm Industrial Hygiene and Safety personnel may survey the job site for safety and health compliance. Atkins 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 WRPS.

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 414.1D, *Quality Assurance*, for facilities and projects with the scope of work
- ASME NQA-1-2008, *Quality Requirements for Nuclear Facility Applications*

Atkins will conduct work in accordance with ET-QA-PN-001, *Quality Assurance Program Plan*, to specific work procedures, and to this work plan

6.0 REFERENCES

10 CFR 830, Subpart A, “Nuclear Safety Management, Quality Assurance Requirements,” *Code of Federal Regulations,* as amended

10 CFR 851, “Worker Safety and Health Program**,”** *Code of Federal Regulations,* as amended

AE-SH-PO-0002, *Integrated Safety Management Policy*, Atkins Energy Americas, Atkins Nuclear Secured Holdings

ASME NQA-1-2008 Edition, *Quality Assurance Requirements for Nuclear Facility Applications,* the American Society of Mechanical Engineers, New York, New York

DOE-0344, Rev 4-1, 2016, *Hanford Site Excavating, Trenching, and Shoring Procedure (HSETSP)*, U.S. Department of Energy, Richland, Washington

DOE Order 414.1D, 2011, *Quality Assurance*, U.S. Department of Energy, Washington, D.C

ET-QA-PN-001, *Quality Assurance Program Plan*, Atkins Energy Federal EPC, Inc., Richland, Washington

AE-FO-PR-001, *Geophysical Logging*, Atkins Energy Federal EPC, Inc., 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-ENV-58747, *Fiscal Years 2014/2015 Completion Report for the 241-A and 241-AX Tank Farms Direct Push Characterization,* Washington River Protection Solutions, LLC, Richland, Washington.

RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)*, Washington River Protection Solutions, LLC, Richland, Washington

RPP-RPT-60227, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area A-AX, Washington River Protection Solutions*, LLC, Richland, Washington

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

APPENDIX B

DRILLING AND SAMPLING DAILY WORK RECORDS

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ATKINS

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Page 1 of 1

DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA,	**LOCATION:** A Tank Farm	**DATE:** 5-21-18	**Report #:** 1
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** NA	**AHA:** NA
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	NA NA	HHU XL #3	**HHU CAT #4**
NA	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole #_____ **Tubing (** **)@** **to** **ft bgs; S.U.** ____	**Boring #** **Interval:** **Type**	
	Borehole #_____ **Tubing (** **)@** **to** **ft bgs; S.U.** ____	NA	
	Borehole #_____ **Tubing (** **)@** **to** **ft bgs; S.U.** ____		

TIME	WORK SUMMARY
0625	Travel to Energy NW to meet with Watts Construction driver.
0700	Loaded the HHU XL #3 on flatbed.
0715	Transported rig #3 to 200 E area, A farm.
0745	Staged rig #3 at pre-determined area across from A farm Pre survey to be conducted at a later time.
0815	Met with WRPS FWS to set up a pipe cleaning area near the marshalling yards paint shop.
0900	Pipe moved to that designated area. Pipe cleaning to commence on 5-22.
0935	Return to ENW to pick up supplies.

RZS 5-21-18

OPERATOR/LICENSE: NA **PERSONNEL:** Olin Amos, Rory Steffler	**WEATHER/DOWNTIME:** Not pertinent	**DISCARDED ITEMS:** NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler	**REVIEWED BY:** Kelly Olson
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: RZ. Steffler	**SIGNATURE:** Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06-07-18	**Report #:** 2
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** N/A	**AHA:** N/A
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	N/A N/A	(HHU XL #3)	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole #_____**Tubing (** **)@** **to** **ft bgs; S.U.** _____	**Boring #** **Interval:** **Type**	
	Borehole #_____**Tubing (** **)@** **to** **ft bgs; S.U.** _____	N/A	
	Borehole # **Tubing (** **)@** **to** **ft bgs; S.U.**		

TIME	WORK SUMMARY
0730	Travel to 200 East area
0800	Attempted to pick up respiratory equipment, found we were not in system
0830	Getting paperwork and requirements met to be placed back in system at mask station
1030	Requirements met, acced in, pick up respiratory equipment
1045	Lunch
1245	Dress into whites, move rig #3 into A ~~AX~~ farm, check hubs for other up-coming locations (KG - 06/18/18)
1700	Survey out and return equipment
1420	Return to shop
1630	End of shift

NA

OPERATOR/LICENSE: Olson, 1217 **PERSONNEL:** weakley	**WEATHER/DOWNTIME:** 83° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: L. O. Amos
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: LO Amos

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06/11/18	**Report #:** 3
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** N/A
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18-0125	(HHU XL #3)	**HHU CAT #4**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9385 Tubing (2½") @ \ to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0620	Travel to 200 East
0646	Meet at G-229 for plan of the day meeting with WRPS personell
0758	Meeting concluded, pick up respiratory equipment, acc in
0831	Teamsters deliver WRPS Parts/shop trailer to West of 'A' farm
0920	Operators load stantions for noise barrier in farm in steel box
0945	Operators deliver fork-lift to 'A' farm
1015	Rick Franzen contacted U-Dig and aquired confirmation number
	Getting material and equipment ready to enter farm
1045	Lunch
1215	Operators, HPTs on site, stage equipment at gate
	on west side of 'A' farm
1230	Dress into whites, set up respiratory protection
1245	Enter farm, install felt and plastic under rig, set
	up on C-9385, operators brought in equipment for driving
	except for pipe and racks. (set up approximately 2' south of C-9383)
1320	Exit farm, survey out of farm
1330	Return respiratory equipment, Pick up rack for pipe at
	marshalling yard, move 2 racks of 2½" drive-pipe out of
	conex in RMA west of A farm.
1440	Return to shop and gather supplies for cleaning 2½"
	pipe in RMA
1630	End of shift
	NA

OPERATOR/LICENSE: Olson, 1217

PERSONNEL: M. WEAKLEY, I. Villareal, C. Catron, P. Lyndsey

WEATHER/DOWNTIME: 75° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: LO AMOS

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: L O. Amos

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06/12/18	**Report #:** 4
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** N/A
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN18-0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-4385 Tubing (\ ) @ to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0615	Travel to 200 East
0647	Arrive at 200 East plan of the day meeting for cleaning pipe
0730	Meeting concluded, Operators and OPs picking up water and supplies for cleaning pipe. Set up plastic and stands in RMA 12, begin cleaning 2½" drive pipe with support of WRPS operators, RCT's, and I-H. Cleaned and packed 300' of 2½" pipe with simple green solution, American Electric emptied Conex of Pipe racks with zoom-boom forklift.
1045	Lunch
1220	Support back at RMA cleaned an additional 600' (900' total) 2½" drive pipe, cleaned up area, put away equipment
1430	Travel to shop, paperwork, fuel pick-up.
1630	End of shift
	NA

OPERATOR/LICENSE: Olson, 1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weckley, C. Catron, I. Vallereal, H. Young	80°, windy	NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** L O Amos
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** L O. Amos

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 54'	**LOCATION:** A Tank Farm	**DATE:** 06/13/18	**Report #:** 5
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AK-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18245144 DAN 18-0125	**HHU CASE #1** HHU XL #3	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9385 Tubing (2½") @ 0' to 54' 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**

N/A

TIME	WORK SUMMARY
0620	Travel to 200 East
0700	Pre-job meeting
0800	Pre-job concludes, Ace in, pick up respiratory gear.
0830	Arrive at A farm
0940	Moving in drill string with forklift, dress in, don respiratory protection
0955	Begin driving 2½" pipe, I-H and NCO's set up noise boundaries, RCT made check of drive area prior to pushing
	Drove 2½" drive pipe 0' to 54', changed air bottles once,
1100	secure site, break for Lunch, had equipment surveyed out.
1240	Stop work for AOP-08, high winds, return respiratory
	equipment, travel to office
1630	End of shift

NA

OPERATOR/LICENSE: Olson 1217

PERSONNEL: M. Weakley

WEATHER/DOWNTIME: 81° very windy

DISCARDED ITEMS: 2 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE : TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: Lo Amos

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: Lo O. Amos

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 70'	LOCATION: A Tank Farm	DATE: 06/14/18	Report #: 6
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AY-063	AHA: EI-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN18-0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9385 Tubing (2½") @ 54' to 124' ft bgs; S.U. 23

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Pre-job meeting
0730	Meeting concluded, travel to A-farm
0820	Airbottles delivered to A-farm, Dress into whites, don respiratory protection.
0835	Enter farm, operators hung additional noise warning signs, ACT conducted pre-work survey, Drove 2½" drill string from 54' to 88' b.g.s.
0920	Drill head became hot, exited farm, surveyed out equipment
0950	Break for Lunch and allow head to cool.
1205	Dress into whites, don respiratory protection
1231	Enter farm drive 2½" exploratory pipe at C-9385 (vertical location) from 88' to 124' b.g.s.
1312	Head became hot, exited farm, survey out equipment and return masks and racks to mask station
1345	Travel to office, paperwork, gather needed equipment for upcoming week.
1630	End of shift

N A

OPERATOR/LICENSE: 1217 Olson PERSONNEL: M. Weakley, I. Villarral, C. Catron, H. Young, P. Lindsey	WEATHER/DOWNTIME: 80° sunny	DISCARDED ITEMS: 5 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson TITLE: TEAM COGNIZANT PERSON SIGNATURE: Kelly Ol	REVIEWED BY: RZ Stoffler TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 44'	**LOCATION:** A Tank Farm	**DATE:** 06-18-18	**Report #:** 7
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 / DAN 18 0125	**HHU XL #**	**HHU CAT #4**

N/A

BOREHOLE SUMMARY, END OF SHIFT

Borehole # C-9385 Tubing (2½") @ ~~140~~ 124 to 168 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
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0643	Arrive at 200 east, pre-job
0715	Pre-job concludes, pick up respiratory equipment, acc in, travel to A. Farm
0815	Air bottles delivered, WRPS personnell on site, Dress into whites, don respiratory protection
0830	Enter farm fuel and inspect rig, drive 2½" drill pipe from 124' to 140' b.g.s. Head became hot at that point.
0920	Exit farm, survey out equipment
0940	Break for lunch and allow head to cool
1203	Dress into whites, don respiratory protection
1230	Enter farm, drive 2½" tubing from 140' to 168' b.g.s.
1300	Head became hot, exit farm, survey out equipment
1315	Return respiratory equipment to mask station, took training to use golf carts with new modifactions for carry-air
1400	Return to shop, paperwork, time cards.
1630	End of shift

NA

OPERATOR/LICENSE: 1217 Olson **PERSONNEL:** M. Weakley, C. Catron, H. Young, P. Lydsey, I. Vilkreal	**WEATHER/DOWNTIME:** 77° cloudy	**DISCARDED ITEMS:** 2 Lynch pins (5 gals. Diesel fuel)

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stoffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 32'	LOCATION: A Tank Farm	DATE: 06-19-18	Report #: 8
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-605
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / ~~HHU XL #3~~	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-4385 Tubing (2½) @ 168 to 200' ft bgs; S.U. 2.3	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Pre-job meeting
0715	Pre-job meeting concludes, pick up respiratory equipment travel to A-Farm
0800	Air bottles and WRPS personell on site, dress into whites, NCO's change out (add to) hearing protection signs, IH techs attach monitering equiement to drill team
0830	Enter farm, drive 2½" tubing From 168' to 188' b.g.s
0915	Drill head reached high operating temperature, exit farm, survey out equipment
0930	Break for lunch and allow head to cool.
1145	WRPS personell on site, Dress into whites.
1205	When donning respiratory gear an air line leak was detected on Mike Weakley's SCBA Rack, Return Rack to mask station and picked up new one, return to A farm.
1230	Dress into whites, don gear
1245	Enter farm, drive 2½" tubing 188' to 200' b.g.s
1325	Head became hot exit farm survey out equipment. NCO's moved and set up cabinet for logging source, return equipment to mask station
1425	Return to shop, paperwork, time cards
1630	End of shift
	N/A

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Catron, I. Villareal, H. Young, P. Lydsey	WEATHER/DOWNTIME: 88° partly cloudy	DISCARDED ITEMS: 4 Lynch Pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 43'	**LOCATION:** A Tank Farm	**DATE:** 06-20-18	**Report #:** 9
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EP-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	182 45144 DAN18 0125	(HHU XL #3)	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9385 Tubing (2½") @ 200' to 243 ft bgs; S.U. 3.3'		**Boring #** **Interval:** **Type**
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0640	Travel to 200 East
0642	Arrive at 200 East, pre-job
0700	Pre-job concluded, Ace in, pick up respiratory protection, travel to A farm
0810	Air bottles and WRPs personell on site, dress into whites, don respiratory protection
0835	Enter farm, check Depth of 2½" tubing, tag = 206.3' tubing = 206.3 (no fill), drove 2½" tubing from 200' to 220' b.g.s. K.O. 6-20-18
0910	Head became hot at this point, exit farm, survey out equipment
0930	Break for lunch and let head cool
1110	All personell back on site, dress into whites don respiratory protection
1130	Enter farm, drive 2½" tubing from 220' to 236' b.g.s.
1155	Head became hot, exit farm to allow cooling period
1305	Dress into whites, Don respiratory equipment, stand-by for Construction crews to clear to enter farm
1330	Enter farm, drive 2½" tubing from 236' to 243' b.g.s. (very hard driving)
1357	Head became hot, exit farm, survey out equipment, return respiratory equipment to mask station
1435	Travel to shop, paperwork, time-cards
1630	End of shift

OPERATOR/LICENSE: Olson # 1217 K.O. 06/20/18	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weakley, P. Lyndsey, M. Young, I. Villareal, C. Catron	93° sunny	5 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 17'	**LOCATION:** A Tank Farm	**DATE:** 06-21-18	**Report #:** 10
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** 4X-063	**AHA:** EI-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN18-0125	(HHU XL #3)	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**

Borehole # C-4385 **Tubing** (2½) **@** 243 **to** 260 **ft bgs; S.U.** 2.3'

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

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

Boring # **Interval:** **Type**: N/A

TIME	WORK SUMMARY
0613	Travel to 200 East
0642	Arrive at 200 East, pre-job
0710	Pre job ends, pick up respiratory protection, travel to A farm
0740	Air bottles and WRPS personell on site, dress into whites don respiratory gear
0805	Enter farm, drive 2½" pipe from 243' to 252' b.g.s
0840	Head became hot, exit farm, let drill head cool
0940	Dress into whites, don respiratory gear
0955	Enter farm, drive 2½" tubing from 252' to 260' b.g.s.
1030	Head became hot, exit farm, survey out equipment, return equipment to mask station
1100	Return to office
1130	Lunch
1200	No entry into farm in P.M. due to WRPS personell having training in afternoon
1630	End of shift

NA

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, C. Catron, I. Villareal, H. Young	**WEATHER/DOWNTIME:** 92° cloudy	**DISCARDED ITEMS:** 2 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stoffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 25.5'	**LOCATION:** A Tank Farm	**DATE:** 06/25-18	**Report #:** 11
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18-0125	**HHU XL #3**	**HHU CAT #4**
N/A			

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9385 Tubing (2½") @ 260 to 285.5 ft bgs; S.U. 2.8'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0649	Arrive at 200 East, pre-job
0715	Pre-job concludes Ace in, pick up respiratory equipment, travel to A Farm
0803	Bottles and WRPS personell on site, Dress into whites, don respiratory gear and noise recording devices
0825	Inspect rig, start-up and drive 2½" tubing from 260 to 272' b.g.s.
0857	Head became hot, exit farm, survey out gear
0930	Lunch and allow head to cool.
1200	Enter change trailer, dress in whites, don respiratory equipment
1230	Drive 2½" tubing from 272' to 285.5' b.g.s (T.D. depth)
1300	Exit farm, survey out equipment, return equipment to mask station
1350	Travel to office, paperwork, time cards, checking plates and needed equipment for up-coming angle push.
1630	End of shift

NA

OPERATOR/LICENSE: Olson #127

PERSONNEL: M. Weakley, C. Catron, F. Villareal, H. Young, P. Lydsey

WEATHER/DOWNTIME: 88°, partly cloudy, windy

DISCARDED ITEMS: 3 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06/26/18	**Report #:** 12
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX - 063	**AHA:** ER-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18295144 DAN 18 - 0125	**HHU XL #3**	**HHU CAT #4**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9385 Tubing (2½") @ 288.3' to ' ft bgs; S.U. 2.8'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Arrive at 200 east, pre-job meeting
0710	Pre-job concludes, pick up respiratory equipment, travel to A farm
0810	Air bottles and WRPS personell on site, Dress into whites, don respiratory equipment
0835	Enter farm tag hole at 288.3' T.O.C., Pipe run = 288.3', Fill = 0', tag weight was dry when removed. Folded up rig, moved a few feet off hole, consolidated materials (stantions etc.) into box for next move.
0915	Exit farm, survey out equipment, return respiratory gear to mask station, go over paper work for next hole.
1045	Return to office, stand by for American Electric to do dirt work at next site, and surveyors to set hubs at next location, set equipment prepared for up-coming work
1630	End of shift

NA

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** C. Catron, H. Young, I. Villareal, P. Lyadsey	**WEATHER/DOWNTIME:** 83° mostly sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06/27/18	**Report #:** 13
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** 4X-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245194 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9385 Tubing (2 1/2") @ 285.5 to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing (\ @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Arrive at 200 East, Pre-job
0705	Pre-job concludes, No work in tank farm, standing by for American Electric to complete dirt work and Surveyors to set hubs, check materials at RMA
0940	Return to office, work on setting angle plates ready for up-coming work
1630	End of shift

N/A

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** P. Lyndsey, C. Catron, I. Villarcal, H. Young	**WEATHER/DOWNTIME:** 88° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** R.Z. Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 06-28-18	Report #: 14
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN18-0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0640	Pre-job delayed for safety stand-down, and delay's at Ace's station and mask station for same reason, Pre-job, Ace in, pick up respiratory equipment.
0905	Travel to A-farm
0920	Surveyors and WRPS personell on site, dress into whites, don respiratory protection
0945	Enter farm with Rogers Surveying, install hubs for bore-holes and Azimuths for angle pushs at C-9391, C-9393, and C-9395, (un-able to get to C-9387 due to trenching and barriers) no problems for set-up seen at these locations.
1630	Exit farm, survey out equipment and return to mask station
1115	No work in afternoon in farm due to lack of recourses and stop work in effect for use of carry-air with motorised vehicles, Return to office load plate for 30° angle push.
1630	End of shift

NA

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: M. Weakley, H. Young, C. Catron, P. Lyndsey	85° sunny	N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 07/02/18	**Report #:** 15
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-SHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18245144 DAN 18 - 0125	**HHU CASE #1** (HHU XL #3)	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ \ to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # **Interval:** **Type**

N/A

TIME	WORK SUMMARY
0610	Travel to 200 East
0646	Arrive at 200 East, pre-job at G-110
0715	Pre-job concludes, Ace in, pick up respiratory equipment Travel to A farm, Fork-lift inspected for carry-air and moved from C-farm RBA to site, load angle plate and equipment
0900	Dress into whites, don respiratory equipment
0920	Enter farm, move angle plate to C-9391, line up and level angle plate, drive four retaining nails
1035	Exit farm, survey out equipment
1055	Lunch
1225	All personell at A-farm, dress into whites, don respiratory gear
1250	Enter farm, complete plate installation, set up rig on C-9391 at 30° (off vertical) angle, operators moved pipe and tooling to location with fork lift.
1400	Exit farm, survey out fork-lift and equipment, return masks to mask station
1415	Return to office, paperwork, time cards
1630	End of shift
	NA

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, O. Amos, C. Cotton, H. Young.	**WEATHER/DOWNTIME:** 78° sunny, windy	**DISCARDED ITEMS:** 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 45'	**LOCATION:** A Tank Farm	**DATE:** 07/03/18	**Report #:** 16
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 DAN 18-0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4391 Tubing (2½") @ 0' to 45' 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

N/A

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Pre-job meeting
0715	Meeting concludes, pick up respiratory gear at mask station, travel to A farm
0800	All personell and bottles on site, dress into whites, don respiratory protection, I.H. fitted crew with noise recording devices
0830	Enter farm, NCO's set up hearing boundary, inspect rig, drive 2½" tubing at 30° angle off vertical from 0' to 45' b.g.s. (Point to stop for 1st Gyro run)
0915	Exit farm, survey out equipment and return gear to mask station
1000	Return to office, stand-by for Gyroscope verification of direction of borehole
1630	End of shift

NA

OPERATOR/LICENSE: Olson # 1217

PERSONNEL: M. Weakley, H. Young, C. Catron

WEATHER/DOWNTIME: 85° partly cloudy

DISCARDED ITEMS: 1 Lynch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stettler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 07/09/18	**Report #:** 17
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EI-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144 DAN-18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 Tubing (2") @ 45' to \ ft bgs; S.U. 5.3		**Boring #** **Interval:** **Type**
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0640	Arrive at 200 East, pre-Job
0720	Pre-job concludes, operators and HPTs looking into transporting samplers from RMA 12 to 222-S labs for cleaning for up-coming work.
0800	Return to shop, gathering materials to clean sampling drill string
0830	Stand-by for preperation of logging equipment
1630	End of shift

NA

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** P. Lydsey, C. Catron	**WEATHER/DOWNTIME:** 95° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 07/10/18	**Report #:** 18
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**
SAMPLE# **INTERVAL:** %	18245144 DAN 18-0125		
N/A			

BOREHOLE SUMMARY END OF SHIFT

Borehole # 25' Tubing (\ ) @ \ to \ ft bgs; S.U. \

Borehole # C9391 Tubing (2½") @ 45' to \ ft bgs; S.U. \

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0640	Arrive at 200 East, pre-job
0710	Pre-job concludes, NCO's pick up fork lift at C-farm, operators gathered supplies
0800	Met WRPS personell at RMA 12, opened Lanes bags, inventoried pipe and cleaned 75 joints of inner rod for Knocking out expendable tips in future
0945	clean up and return to shop, stand-by for Gyro run at 45' bgs at C-9391
1630	End of shift

N A

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakly, P. Lyndsy, C. Catron

WEATHER/DOWNTIME: 87° Sunny Breezy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE : TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 07/11/18	**Report #:** 19
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** Ax-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 **Tubing** (2½") @ 45' **to** \ **ft bgs; S.U.** \ 5.3'		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		N/A
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0600	Cleaning sampling drill string at shop and prepping logging equipment for deployment, no work in tank farms, waiting for 45' b.g.s. gyro run before continuing.
1630	End of shift

NA

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley	**WEATHER/DOWNTIME:** 97° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 7/12/18	**Report #:** 20
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-SHA-065
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18295144 DAN 18 0125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 45' to \ 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**

N/A

TIME	WORK SUMMARY
0600	Cleaning pipe at shop
0830	Picked up logging equipment, travel to 200 west area, performed depth calibration per procedure at well 699-48-77A
1300	Return to shop.
1230	Lunch
1300	Set up equipment and ran function test for Gyroscope. No work was done in tank farm, re-start of driving waiting on 45' gyro run.
1630	End of shift

N/A

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, L. Amos, A. Hoopes

WEATHER/DOWNTIME: 97° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 7-16-18	**Report #:** 21
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN180125	HHU XL #3	**HHU CAT #4**
NA	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 **Tubing** (2½) @ 45' to ft bgs; **S.U.** 5.3'		**Boring #** **Interval:** **Type**
	Borehole # _____ **Tubing** ( ) @ to ft bgs; **S.U.** _____		NA
	Borehole # **Tubing** ( ) @ to ft bgs; **S.U.**		

TIME	WORK SUMMARY
0620	Travel to 2704 HV for pre job brief.
0706	Pre job. Discuss process required to gyroscope.
0733	Pre job brief complete. ACE in and check out mark + rack.
0840	Entered A farm with gyroscope and cart.
0855	Set up gyroscope and cart for 30 minute warm up, but the program kept coming up with an error message. Tried to troubleshoot the problem, but all efforts failed.
0945	Gave up and exited A farm.
1030	All equipment surveyed out of farm. Returned checked out equipment. Travel to West Richland.
1120	Dropped off all equipment at Three Rivers Scientific for more troubleshooting.
1330	Three Rivers Scientific figured out the problem. Updating the program error. Will try to gyroscope on 7-17-18.
1630	End of shift.

RZS 7-16-18

OPERATOR/LICENSE: 1224	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: Olin Amos, Mike Weakley, Rory Steffler	Clear / Hot	NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler	**REVIEWED BY:** Kelly Olson
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler	**SIGNATURE:** Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 7-17-18	**Report #:** 22
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN180125	**HHU XL #3**	**HHU CAT #4**
NA	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C9391 **Tubing** (2 1/2) @ 45 to ft bgs; **S.U.** 5.3'		**Boring #** **Interval:** **Type**
	Borehole # ____ **Tubing** ( ) @ to ft bgs; **S.U.** ____		C9391 Gyroscope
	Borehole # ____ **Tubing** ( ) @ to ft bgs; **S.U.** ____		

TIME	WORK SUMMARY
0610	Pick up equipment at Three Rivers Scientific and travel to 2704 HV.
0651	Pre job. No driving for 7 days after the pad near C9391 has been poured. Scheduled for 8-3 and 8-10.
0725	Pre job complete
0740	Arrived at A farm. Staged cart + equipment.
0835	Entered A farm.
0840	Set up equipment to perform gyroscope survey. After 30 minute warm up (File # 07-17-2018 T8.40.11 AM.txt) we performed 3 gyroscope surveys to ensure repeatability. File #s:
	07-17-2018T 9.11.08 AM.txt
	07-17-2018T 9.25.05 AM.txt
	07-17-2018T 9.39.12 AM.txt
1000	Exit. A farm.
1030	Returned masks + racks to 2704HV. Travel to shop.
1200	Lunch.
1630	End of shift.
	RZS 7-17-18

OPERATOR/LICENSE: 1224	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: Olin Amos, Rory Steffler	Hot! Real hot!	NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler	**REVIEWED BY:** Kelly Olson
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler	**SIGNATURE:** Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 7-18-18	**Report #:** 23
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18-0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 45 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0610	Travel to 200 East
0640	Arrive at 200 East, sign in on pre-job
0650	Receive go-ahead to continue pushing at C-9391, Ace in, pick up respiratory equipment, travel to A farm
0730	Arrive at A-farm, Bottles delivered begin dressing in
0755	Stop work for all excavation in tank farms, stand-by for work to be allowed to continue, no work conducted in tank farm.
0830	Calibrated cerium-bromide tool at Cal-mods at 200 west
1000	Travel to shop, stand-by for stop work for no excavation work in tank farms
1630	End of shift

NA

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catron, H. Young. O. Amos, R. Steffler

WEATHER/DOWNTIME: 95° Sunny Breezy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 7-19-18	**Report #:** 24
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN 18 0125	(HHU XL #3)	**HHU CAT #4**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 45' to \ 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
N/A		

TIME	WORK SUMMARY
0600	Worked at shop receiving and putting away new tooling and equipment, no work was conducted in tank farms due to lack of RCT support.
1630	End of shift

KO 7-19-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley

WEATHER/DOWNTIME: 95° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE : TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 25'	LOCATION: A Tank Farm	DATE: 07/23/18	Report #: 25
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18275144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-9391 Tubing (2½") @ 45' to 70' ft bgs; S.U. 4.3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Pre-job meeting
0745	Pre-job concludes, Ace in, pick up respiratory equipment
0800	Arrive at A farm, stand by for word if Rig is in CA or SCA
0900	Word arrives rig is in SCA, travel to Aces station, re-ace under AX-084
	Return to A farm, don respiratory gear, enter through man gate,
	find Rig is still in CA
1000	Exit farm, travel to Aces station, re-ace under AX-063
1030	Lunch
1200	Dress into whites, don respiratory protection
1225	Enter farm, inspect rig, drive C-9391 from 45' to
	70' b.g.s at 30° (from vertical) angle
1300	Head became hot on rig, exit farm, survey out
	equipment, return equipment to mask station
1345	Travel to office, no logging activities were
	conducted in tank farm because source was not
	at location at A farm
1630	End of shift
	07-23-18
	K.O.

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: Weakley, H. Young, C. Catron, O. Ames, R. Steffler, A. Hooges	99° sunny	1 Lynch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 7/24/18	**Report #:** 26
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18 0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 90' to \ ft bgs; S.U. 4.3'

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

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

GEOPHYSICAL LOGGING

Boring # **Interval:** **Type**

N/A

TIME	WORK SUMMARY
0600	No logging or direct push activities were conducted in tank farm due to lack of RCT support
1630	End of shift

K.O.
07-24-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL:

WEATHER/DOWNTIME: 103° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE : TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 56'	**LOCATION:** A Tank Farm	**DATE:** 7-25-18	**Report #:** 27
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18 0125	**HHU CASE #1** HHU XL #3	**HHU CAT #2** HHU CAT #4

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT 4'

Borehole # C-9391 Tubing (2½") @ 70' to 126 ft bgs; S.U. 126' K.O. 7-25-18

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

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

GEOPHYSICAL LOGGING

Boring # Interval: , Type

C-9385 285-250 Moisture

TIME	WORK SUMMARY
0605	Travel to 200 East
0640	Arrive at 200 east, pre-job
0710	Pre-job concludes, Acc in, pick up respiratory equipment, travel to A farm
0740	Arrive at A farm, Dress into whites, don respiratory gear
0830	Enter farm, inspect rig, Drive 2½" tubing from 70' to 94', head became hot
0855	Exit farm to allow head to cool
0945	Dress into whites, enter farm drive from 94' to 106 B.g.s.
1015	Exit farm survey out equipment
1030	Lunch
1215	Dress into whites, don respiratory protection
1235	Enter farm, drive C-9391 from 106' to 126' b.g.s. at 30° angle
1300	Head became hot (also on 50/50 heat resiment) exit farm survey out equipment, return gear to mask station Moisture logging was completed at C-9385 from 285' to 250'
1430	Travel to shop
1630	End of shift

K.O. 7-25-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, H. Young, O. Amos, A. Hoopes, P. Lynds, D. Frie2

WEATHER/DOWNTIME: 102° sunny

DISCARDED ITEMS: 1 lynch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 41'	LOCATION: A Tank Farm	DATE: 7-26-18	Report #: 28
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18275144 DAN 18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # C-9391 Tubing (2½") @ 126 to 167 ft bgs; S.U. 3.3'
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \

GEOPHYSICAL LOGGING: Boring # C-9385 Interval: 250 Type: Moisture

TIME	WORK SUMMARY
0610	Travel to 200 East
0640	Arrive at 200 East, pre-job
0700	Pre job concludes, pick up respiratory equipment, travel to A farm
0730	Arrive at A farm, Dress into whites don respiratory gear
0815	Enter farm, inspect rig, drive 2½" tubing from 126' to
0900	154' b.g.s., head became hot at that point.
0950	Exit farm, allow head to cool
0950	Dress into whites enter farm drive drill tubing fom 154' to 162' b.g.s,
1030	Head became hot, exit farm, no logging conducted due to equipment malfunction, cart and equipment surveyed out
1045	Lunch
1230	Dress into whites, don respiratory gear
1230	K.O. Enter farm, drive 2½" tubing at 30° angle from ~~162'~~ 162' K.O. 7-26-18 to ~~267'~~ 167' b.g.s. K.O. 7-26-18
1315	Shut down due to Crane swinging piping over work area, exit farm, survey out equipment, return gear to mask station
1400	Travel to shop
1630	End of shift

K.O. 7-26-18

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME: 1030 sunny	DISCARDED ITEMS: 2 Lynch pins
PERSONNEL: M. Weakley, A. Hoopes, H. Young, P. Lindsy, C. Catron		

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 7-30-18	**Report #:** 29
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 Tubing (2½") @ 167 to \ ft bgs; S.U. \		Boring # C-9385 Interval: \ Type \
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Arrive at 200 East, pre-job
0830	Return to shop, no field work in tank farm conducted due to lack of recourses and RCT instrumentation
1630	End of shift

K.O. 7-30-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Wakley, H. Young, O. Amos, A Hooper	**WEATHER/DOWNTIME:** 106° Sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: \	LOCATION: A Tank Farm	DATE: 7-31-18	Report #: 30
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18275144 DAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 167' to \ ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9385	\	\

TIME	WORK SUMMARY
0600	Worked on prepping plate and equipment for upcoming work at shop, no field activities were conducted in tank farm, due to lack of support recourses.
1630	End of shift

K.O. 7-31-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, A-Hoopes, O. Amos

WEATHER/DOWNTIME: 107° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 2'	**LOCATION:** A Tank Farm	**DATE:** 8-1-18	**Report #:** 31
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18 0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 167 to 169 ft bgs; S.U. 85'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9385	252-74	moisture

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Arrive at 200 East, pre-job
0705	Pre job concludes, gee in, pick up respiratory gear
0730	Arrive at A farm, dress into whites, don respiratory gear
0805	Enter farm, inspect rig, drive 2½" tubing from 167' to 169' b.g.s., noticed crack in main drive sub on hammer, disconnected from drill string, folded up rig for transport to shop for repair.
0830	Exit farm, moisture logging in progress, stand-by for route map and plan to move rig.
1250	Dress into whites, don respiratory protection
1315	Enter farm, tag hole C-9391 at 174.3' to D.C. Pipe string ≈ 174.3' (no fill) move rig to gate near evaporator to be surveyed out tommorow, wrap up logging operation
1405	Exit farm, survey out equipment, return gear to mask station
1430	Travel to shop
1630	End of shift

K.O. 8-1-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catron, H. Young, P. Lyndsey, O. Amos, A. Hooles

WEATHER/DOWNTIME: 99° Sunny Breezy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: \	LOCATION: A Tank Farm	DATE: 8-2-18	Report #: 32
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18275144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # C-9391 Tubing (2½") @ 169' to \ ft bgs; S.U. 5'
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \

Boring #	Interval:	Type
C9385	\	\

TIME	WORK SUMMARY
0620	Travel to 200 East mask station
0655	Arrive at mask station pick up respiratory protection
0715	Arrive at A farm, Dress in whites, don respiratory protection
0800	(Pre-job was conducted at change trailer) Enter farm, move Rig # 3 out of evaporator gate and stage for exit survey, Also attempted to resume moisture logging but encountered equipment problems, surveyed out logging cart.
0915	Return respiratory gear to mask station
0935	Return to shop, return logging equipment to three rivers Scientific for repair.
1500	Release survey completed on Rig #3
1630	End of shift

K.O. 8-2-18

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: M. Weakley, C. Catron, H. Young, P. Lynday, O. Amos, A. Hoopes	92° sunny windy	N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: \	**LOCATION:** A Tank Farm	**DATE:** 8-6-18	**Report #:** 33
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # C-9391 **Tubing** (2½) @ 169 **to** \ **ft bgs; S.U.** \	**Boring #** **Interval:** **Type**	
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \	N/A	
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0600	No logging or direct push activities were conducted in tank farms, waiting on mechanical repairs on equipment for both operations.
1630	End of shift
	K.O. 8-6-18

OPERATOR/LICENSE: Olson # 1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M Weakley, O. Amos, A. Hoopes	98° sunny	N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: \	**LOCATION:** A Tank Farm	**DATE:** 8-7-18	**Report #:** 34
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18 0125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE# INTERVAL: %

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 169' to \ ft bgs; S.U. 5'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9385	\	\

TIME	WORK SUMMARY
0600	Travel to Hanford, Watts construction picked up Rig #3 and hauled to shop, where large adaptor head was replaced, accumulators were checked and lubed rig. Logging equipment was transported to depth calibration well at 200 west and was tested for operability, three rivers scientific replaced some parts. No work was conducted in tank farms due to lack of support resources
1630	End of shift

K.O. 8-7-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, O. Amos, A. Hoopes

WEATHER/DOWNTIME: 102° sunny

DISCARDED ITEMS: 1 - large adaptor head plug + Bearings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE : TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 8-8-18	**Report #:** 35
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 169' to \ ft bgs; S.U. 5'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9385	282'-246'	moisture
C-9385	74.-0'	moisture

TIME	WORK SUMMARY
0600	Prep rig #3 for transport at shop, pick up logging equipment at 3 rivers scientific
0700	Load rig on Watts construction truck and transport to A-farm, off load rig, pre-job
0830	Enter farm, begin logging operations, moved rig HHU-XL3 back to location and re-set up on 30° (off vertical) angle push, no driving activity conducted because near-by concrete ~~pone~~ K.O. 8-8-18 pour not cured enough to tolerate vibration, (currently at 69% cure). Moisture logged from 74.5' to 0', Also ran a re-run from 282.59' to 246.87' with moisture log.
1230	Complete logging activity, put away equipment
1300	Exit farm, survey out equipment, return gear to mark station.
1630	End of shift

K.O. 8-8-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, A. Hooper, H. Young, I. Villareal, P. Lydsy	**WEATHER/DOWNTIME:** 105° sunny	**DISCARDED ITEMS:** 10 gals diesel fuel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 42'	**LOCATION:** A Tank Farm	**DATE:** 8-9-18	**Report #:** 36
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18 0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# INTERVAL: %

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 169' to 211' ft bgs; S.U. 3

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9385	282-223'	Gamma

TIME	WORK SUMMARY
0610	Travel to 200 East
0693	Arrive at 200 East pre-job
0710	Pre-job concludes, Acc in, pick up respiratory protection travel to A-farm
0805	Enter farm, inspect rig, besin logging operations, drove 2½" tubing from 169' to 178', head became hot, shut down.
0840	Exit farm, survey out equipment, let head cool.
0930	Dress into whites, don respiratory protection
0945	Enter farm, drive 2½" tubing from 178' to 199' b.g.s.
1015	Exit farm, survey out equipment
1040	Lunch
1230	Dress into whites, don respiratory equipment
1245	Enter farm, drive 2" tubing from 199' to 211' b.g.s.
1320	Exit farm, survey out equipment, shut down logging equipment, gamma logging was completed from 282' to 223' B.g.s., return gear to mask station, survey logging cart out of farm and return to three rivers scientific
1630	End of shift
	K.O. 8-9-18

OPERATOR/LICENSE: Olson # 1217

PERSONNEL: M. Weakley, H. Young, A. Hoopes, C. Catron

WEATHER/DOWNTIME: 112° sunny

DISCARDED ITEMS: 5 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 27'	**LOCATION:** A Tank Farm	**DATE:** 8-13-18	**Report #:** 37
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18 0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 211' to 238 ft bgs; S.U. 4'

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

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

GEOPHYSICAL LOGGING

Boring # C-9385 Interval: 223'-172 Type Gamma

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Pre-job meeting
0710	Pre-job ends, pick up respiratory gear, ace in, travel to A farm
0740	Dress into whites, don respiratory gear and sound devices
0805	Enter farm, inspect rig, re-center over hole, begin logging operations, drive 2½" tubing from 211' to 230' bgs at 30° angle.
0845	Head became hot exit farm, allow head to cool
0930	Dress into whites, Don respiratory equipment
0945	Enter farm, drive from 230' to 234' (hard driving)
1015	Exit farm, survey out equipment
1040	Lunch
1230	Dress into whites, don SCBA's,
1245	Enter farm, begin shutting down logging operations, gamma logging completed from 223' to 172', Drove 2½" tubing from 230' to 234' (continue hard driving)
1315	Head became hot, exit farm, survey out equipment, return gear to mask station
1340	Return to shop
1630	End of shift
	K.O. 8-13-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weekley, C. Catron, P. Lyndsey, A. Hooper, H. Young

WEATHER/DOWNTIME: 90° smokey

DISCARDED ITEMS: 4 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 20'	**LOCATION:** A Tank Farm	**DATE:** 8-14-18	**Report #:** 38
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18275144 DAN 18 0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½") @ 238 to 258 ft bgs; S.U. 4'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9385	172'-100'	GAMMA

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Pre-job
0710	Pre-job concludes, pick up respiratory gear, travel to A farm
0745	Dress into whites, don respiratory gear
0800	Enter farm, inspect rig, Check Hubs for up-coming work Begin logging activity, drive C-9391 from 238' to 296' bgs at 30° angle (hard driving)
0845	Head became hot, exited farm to allow cooling time
0930	Dress into whites don respiratory gear
0945	Enter farm, drive 2½" tubing from 296' to 250'
1015	Head became hot, exit farm, survey out equipment
1030	lunch
1220	Dress into whites, don respiratory protection
1250	Enter farm drive 2½" tubing from 250' to 258' bgs
1320	Head became hot exit farm, while retrieving the gamma tool at the end of the day ~~the day~~ hour the probe seperated at 70' (cause yet to be determined) and is beleived to have fallen to the bottom of the hole, camera survey to be run tommorow to determine fishing plan.
1630	End of shift
	K.O. 8-14-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, A. Hoopes, P. Lynder, C. Catron, H. Young	**WEATHER/DOWNTIME:** 92° smokey	**DISCARDED ITEMS:** 4 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 16'	LOCATION: A Tank Farm	DATE: 8-15-18	Report #: 39
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18275144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9391 Tubing (2½") @ 258' to 274' ft bgs; S.U. 4' Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type C-9385 \ \	

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Pre-job
0710	Pre job concludes, Ace in, pick up respiratory gear, travel to A farm
0745	Dress into whites, don masks and noise monitering equipment
0800	Enter farm, drive 2½ tubing from 258 to 263' (hard driving)
0845	Head became hot, exit farm, survey out equipment.
0945	Dress into whites, enter farm, drive from 263' to 269 b.g.s., head became hot (hard driving)
1020	Exit farm, survey out equipment.
1040	Lunch
1220	Dress into whites, don respiratory gear
1245	Enter farm, drive 2½" tubing from 258' to 274' b.g.s. Ran camera survey at C-9385, appears to be seperated casing at 72'
1430	Survey out equipment return masks to mask station, travel to shop
1630	End of shift

K.O. 8-15-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, A. Hoopes, C. Catron, H. Young	WEATHER/DOWNTIME: 97° smokey	DISCARDED ITEMS: 4 lynch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 5.7'	**LOCATION:** A Tank Farm	**DATE:** 8-16-18	**Report #:** 40
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**

Borehole # C-9391 **Tubing** (2½) @ 274 **to** 279.7 **ft bgs; S.U.** 2.9'
Borehole # \ **Tubing** (\ ) @ \ **to** 279.7 **ft bgs; S.U.** \
Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \

Geophysical Logging: Boring # C-9395 | Interval: \ | Type \

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Arrive at 200 East, pre-job
0710	Pre-job concludes, pick up respiratory gear, travel to A farm
0800	Press into whites, don respiratory protection
0815	Enter farm, inspect rig drive C-9391 from 274' to 279.7' (Total planned depth 279') bag tagged bottom of hole at 282.3' (total pipe string = 282.3') no fill in drill string, back pulled pipe 282.7' to 274', re-tagged hole at 282.3' again. (checking for broken pipe) it appears pipe is intact.
0915	Exit farm, survey out equipment, return gear to mask station, waiting on American Electric to move equipment and level gravel piles before moving to next location
0945	Return to shop
1630	End of shift

K.O. 8-16-18

OPERATOR/LICENSE: Olson #1217
PERSONNEL: M. Weakley, C. Gatron, P. Lyndsey, H. Young

WEATHER/DOWNTIME: 97° smokey

DISCARDED ITEMS: 3 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 8-20-18	**Report #:** 41
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN 18 0125	(HHU XL #3)	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # N/A Tubing (\ ) @ \ to \ ft bgs; S.U. \		Boring # C-9185 Interval: \ Type \
	Borehole # N/A Tubing (\ ) @ \ to \ ft bgs; S.U. \		
	Borehole # N/A Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East, pre-job
0720	Pre job concludes, travel to RMA #12, operators pick up cleaning supplies and equipment for cleaning drill string, set up and clean 52 joints of 2½" drill string and load into new lane bag for up-coming 45° angle drive, Depth calibration was done on logging equipment at 200 west area, RCT's were working on down-posting area around C-9391 from a CA to an SCA.
1130	Return to shop, waiting for equipment to be moved, gravel piles leveled and camera run and Gyro run to be completed before moving HHV XL #3 to next location
1630	End of shift

K.O. 8-20-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, C. Catron, P. Lyndsy, L. Amos, A Hooper	**WEATHER/DOWNTIME:** 91° very smokey	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 8-21-18	**Report #:** 42
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-84, AX-63	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18275144 DAN180125	HHU XL #3	**HHU CAT #4**
NA	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C9391 **Tubing** (2½) @ **to** 249.9 **ft bgs; S.U.** 2.9		**Boring #** C9391 **Interval:** NA **Type**
	Borehole # ____ **Tubing** ( ) @ **to** **ft bgs; S.U.** ____		
	Borehole # **Tubing** ( ) @ **to** **ft bgs; S.U.**		

TIME	WORK SUMMARY
0615	Travel to 200 East area.
0655	Pre job at 2704HV. Attempt to perform camera survey and gyroscope C9391. Afternoon, make an entry to try to adjust, K-9385. Borehole C9391 has been down potted. No whites. New RWP. Now AX-84.
0730	Pre job concluded.
0741	Ace in under RWP AX-084.
0835	Enter A-Farm. Set up on C9391 with camera survey equipment. While running the camera down hole, a break with approximately 6 inches of seperation was seen at approximatly 180' pipe run. The camera was extrated and Rig # 3 set back up on the pipe. The tubing was pushed and hammered untill there was no seperation. A second camera survey was performed. The camera wouldnt go to the bottom of the borehole because of soil at approximatly 249 ft. pipe run.
1010	Exited A farm with unneccessary gryoscope equipment. Due to the unexpected condition of the borehole, Radcon is conferring with management for camera retieval.
1230	Pre job for camera retrieval, Full whites and enter on AX-63.
1315	Enter A farm to retrieve the camera. No contamination found.
1415	Exit farm.
1525	Returned to shop.

OPERATOR/LICENSE: 1224 **PERSONNEL:** RZ Steffler, Olin Amos, Aquilla Hoopes.	**WEATHER/DOWNTIME:** Smokey / Hot / ≈ 90°	**DISCARDED ITEMS:** None

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler	**REVIEWED BY:** AQUILA HOOPES
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler	**SIGNATURE:**

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8/22/18	Report #: 43
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18275144 DAN 180125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE# INTERVAL: %

N/A

BOREHOLE SUMMARY END OF SHIFT

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

N/A

TIME	WORK SUMMARY
0740	TRAVELED TO SMURF BUILDING FOR DOD.
0810	ARRIVED AT A FARM TO PERFORM DUMMIE GYRO TEST AND POSSIBLY REAL GYRO IF DUMMIE IS ABLE TO PASS THROUGH BREAK AT 180 FT.
0835	ENTERED FARM, TO SETUP DUMMIE TEST AND GYRO EQUIPMENT.
1000	EXITED FARM DUE TO DUMMIE WOULD NOT PASS CASING BREAK. NOTIFIED SUPERIORS ON PATH FORWARD.
1230	ENTERED BACK INTO FARM TO BRING ALL EQUIPMENT OUT AND BACK TO RICHLAND SHOP.
1310	RETURN TO SHOP.

NOT USED
AH 8/22/18

OPERATOR/LICENSE: 1224

PERSONNEL: OLIN AMOS, AQUILA HOOPES

WEATHER/DOWNTIME: SMOKEY / HOT 93°

DISCARDED ITEMS: NONE

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: A HOOPES

TITLE: TEAM COGNIZANT PERSON

SIGNATURE:

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-23-18	Report #: 44
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: G1-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18275144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING

Borehole # C-9391 Tubing (2½) @ 27.2 to \ ft bgs; S.U. 2.9

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

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

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	Ready rig #4 for transport
0630	Watts truck arrives at shop transport rig #4 to 200 East area, (east of A-farm) off load rig and stage for entry survey by RCT's, off load Plate for 15° (from vertical) boring near WRPS Parts trailer.
0830	No work was conducted in tank farms due to returned equipment to mask station by an individual infected with Ringworm, no masks and racks are to be issued until further cleaning and dis-infecting measures taken at mask station. Return to shop
1630	

K.O. 8-23-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: K. Olson, M. Weakly, O. Amos, C. Catron

WEATHER/DOWNTIME: 85° Hazy smokey

DISCARDED ITEMS: 1 Nylatrol insert for centralizer, 1 5' hydraulic hose

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-27-18	Report #: 45
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SH4-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 180125	~~HHU XL #3~~	~~HHU CAT #4~~
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	Operators entered A farm and brought logging cart out of farm after cart being surveyed, cart was picked up and transported to three rivers scientific. No work was conducted in tank farm, waiting on survey plan and pre-entry survey for rig #4 and waiting on course of action plan for C-9391.
1630	End of shift

K.O 8-27-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, A. Hooper	WEATHER/DOWNTIME: 79° mostly sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-28-18	Report #: 46
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING

Borehole # C-9391 Tubing (2½") @ to 279.7' ft bgs; S.U. 2.9'

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

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

Boring # Interval: Type: N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East, Pre-job
0715	Pre-job concludes, Pick up respiratory gear, ace in travel to A-farm
0730	Meet with W.R.P.S representitive at Rig #4 to verify operation of Lock-out switch and making sure it meets standards for eight criteria lock and tag.
0800	Dress into whites, enter farm, set up and perform camera survey at C-9391, camera was ran to 254' b.g.s. Dropped off respiratory equipment at mask station
1000	Return to office
1300	RCT's have completed Pre-survey of Rig #4, RCTs returned to office to write up survey report
1630	End of shift

K.O. 8-28-18

K.O. - 8-28-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, R. Steffler, C. Catron, P. Lyndsy	WEATHER/DOWNTIME: 80° mostly sunny	DISCARDED ITEMS: 15 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 8-29-18	**Report #:** 47
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18245144 DAN 18 0125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9385 Tubing (2½") @ to 285 ft bgs; S.U. 2.8

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Arrive at 200 East pre-job
0715	Pre job concludes, pick up respiratory gear, gear in, travel to A farm
0745	load tools and equipment from parts trailer, crane had to be moved at RMA 12 to access inner rod, construction moved crane, Operators picked up forklift and moved Rod and supplies to East gate, Steve White inspected Rig #4 for carry-air use, it was approved.
0910	Dress into whites, don SCBA's, move rig #4 and equipment to C-9385 and set up on hole to attempt to fish lossing tool
1000	Tag hole (top of probe tagged at 283.05 T.O.C.) Ran in 16 joints inner rods, survey out equipment.
1100	Lunch
1215	Return to A farm, dress into whites, don respiratory equipment, enter farm, install remaining inner rod to top of probe, attempt to grab with fishing tool, pulled inner rod and fishing socket, probe was not retrieved, Survey out equipment and fishing socket for possible modifacation at machine shop
1400	Return equipment to mask station, return to office
1630	End of shift
	K.O. 8-29-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley - O. Amis, A Hoopes, H. Young, C. Catron

WEATHER/DOWNTIME: 92° Breezy - Sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-30-18	Report #: 48
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EJ-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. ____	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. ____	N/A	
	Borehole # \ Tubing (\ ) @ \ to ft bgs; S.U.		

TIME	WORK SUMMARY
0600	No work conducted in tank farms due to lack of support and not on work schedule
1630	End of shift

K.O. 8-30-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, A. Hoopes, O. Amos	WEATHER/DOWNTIME: 82° Sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 09/04/18	**Report #:** 49
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**

Borehole # C-9393 Tubing (2½) @ / to / ft bgs; S.U. /

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

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

Boring # N/A Interval: Type

TIME	WORK SUMMARY
0630	Travel to 200 East
0700	Pre-job
0730	Pre-job concludes, Ace in, pick up respiratory gear travel to A farm
0800	Arrive at A farm, Dress into whites, Don respiratory protection
0830	Enter farm, RCT's up-post area around C-9393 from SCA to CA in order to move rig, operators pick up fork lift and move 15° plate and nails to location, set up plate drive in retaining nails.
1045	Exit farm, survey out equipment
1100	Lunch
1230	Dress into whites, don SCBA's, operators move in 300' of 2½" drill string, set up HHV XL #3 on C-9393 at 15° (off vertical)
1345	Exit farm survey out equipment
1400	Return Gear to mask station
1420	Return to office to make up new drive tip
1630	End of shift

K.O. 09-04-18

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weakley, C. Cutron, A. Hoopes, O. Amos, R. Lyndsy, H. Young	82° sunny	N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 45'	**LOCATION:** A Tank Farm	**DATE:** 09/05/18	**Report #:** 50
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** 4K-063	**AHA:** ER-SH-JH4-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole #C-9393 Tubing (2½") @ 0' to 45' ft bgs; S.U. 5.3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0640	Arrive at 200 East, pre-job
0715	Pre-job concludes, Ace in, pick up Respiratory protection
0750	Dress into whites, don respiratory gear, noise monitering gear
0810	Enter farm, fuel and inspect rig, finish set-up and drive 2½" tubing from 0' to 45' at 15° angle at C-9393, Enter and perform camera survey at C-9385, change out bottles and run in fishing tool and inner rod to retreive gamma probe at C-9385, begin pulling inner rod.
1015	Survey out equipment
1030	Lunch
1230	Dress into whites don respiratory protection
1245	Enter farm pull remaining inner rod and fishing socket at C-9385, retrieved upper section of probe (BGO) Attempted to run gyro at hole C-9393 plug in connections did not appear to be correct and equipment was surveyed out of farm, after further review it was found that connections were correct after all, further instruction was received from 3 rivers scientific.
1400	Survey equipment out of Farm, returned masks to mask station
1430	Return to shop
1630	End of shift

K.O. 09-05-18

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weakley, O. Ames, A. Hoopes, C. Catron, P. Lyndsey, H. Young	86° smokey	1 Lynch pin 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 09/06/18	**Report #:** 51
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-SHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18-0125	HHU XL #3	HHU CAT #4
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9393 Tubing (2½") @ 45° to \ ft bgs; S.U. 5.3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work conducted in tank farms due to lack of support.
1630	End of shift

K.O. 9-6-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** O. Amos, M. Weakley, A. Hoopes	**WEATHER/DOWNTIME:** 88° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 09/16/18	Report #: 52
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX - 063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9393 Tubing (2½") @ 45' to \ 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

N/A

TIME	WORK SUMMARY
0600	No work conducted in tank farm due to lack of support.
1630	End of shift

K.O. 9-10-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: O. Amos, A. Hoopes

WEATHER/DOWNTIME: 79° Partly cloudy

DISCARDED ITEMS: Bushing 1 nylatrol for centrizer

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 09-11-18	Report #: 53
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18-0125		
N/A			

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9393 Tubing (2½") @ 45' to ft bgs; S.U. ____

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Arrive at 200 East, Pre job
0720	Pre job concludes, Ace in, pick up respiratory gear travel to A farm
0750	Arrive at A farm, Dress into whites don respiratory gear
0820	Enter farm, Run camera survey at C-9385, discovered broken section of probe wedged in break at 70', Ran Gyroscope at C-9393
0945	Exit farm, survey out equipment
10:00	Return gear to mask station, travel to shop, take data from Gyro to 3 rivers scientific for evaluation.
1115	Lunch
1200	Waiting on gyro results to proceed at C-9393 and fabricating new fishing socket for C-9385
1630	End of shift

K.O. 9-11-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, A. Hooper, C. Cotron, H. Young	WEATHER/DOWNTIME: 79° mostly sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 88'	**LOCATION:** A Tank Farm	**DATE:** 09-12-18	**Report #:** 54
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # C-9393 Tubing (2½) @ 45 to 133' ft bgs; S.U. 3	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Arrive at 200 East, pre-job
0720	Pre-job concludes, pick up respiratory gear, gce in, travel to A farm
0800	Dress into whites, don respiratory gear
0815	Enter farm, drive C-9393 from 45' to 75' b.g.s with 2.5" tubing at 15° angle (from verticle)
0900	Head became hot, exit farm, allow head to cool
1000	Enter farm drive C-9393 from 75' to 100' b.g.s
1030	Head became hot, exit farm, survey out equipment
1100	Lunch
1230	Dress into whites, don respiratory gear
1250	Enter farm drive 2½" tubing from 100' to 133' b.g.s.
1330	Head became hot, exit farm, survey out equipment, turn in respiratory gear to mask station
1400	Return to shop
1630	End of shift
	K.O. 09-12-18

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weakley, H. Young, C. Catron, P. Lynchy	74° sunny	3 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 54	**LOCATION:** A Tank Farm	**DATE:** 07-13-18	**Report #:** 55
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SW-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # C9393 **Tubing** (2½) @ 133 to 187 ft bgs; **S.U.** 7	**Boring #** **Interval:** **Type**	
	Borehole # \ **Tubing** (\ ) @ \ to \ ft bgs; **S.U.** –	N/A	
	Borehole # \ **Tubing** (\ ) @ \ to \ ft bgs; **S.U.** –		

TIME	WORK SUMMARY
0610	Head to 200 east
0650	AT Smerf Bld, Prejob (200 east) buddy system in Farm
0730	Acc in, Pickup rack, head to A Farm
0800	Dress in and enter Farm, Do rig inspection
0815	Begin driving on C9393, 15° Angle From vertical AT 133
0845	Head Heated up to 199°, Exit Farm and let head cool.
0900	Out of Farm.
0953	Dress in and enter A Farm.
1005	Begin driving 2½ in rods
1036	Head is hot again, exit Farm and let cool, @ 163 Feet Survey out equipment
1100	Lunch
1230	Dress into Farm, Don Respiratory equipment
1255	Enter Farm and drive 2½" Rod From 163, to 187 Feet.
1335	Head is hot, exit Farm
1355	Out of Farm, Got word From Rick Franzen to move Rig #4 off C9385 and stage at South end of Farm. Construction needed it moved for Placing Plates
1430	Rig moved, Exit zone Return respitory equipment
1440	Head to shop
1630	End shift

OPERATOR/LICENSE: Amos 1224 **PERSONNEL:** M. weakly, P Lynsy chris Cutron,	**WEATHER/DOWNTIME:** 73° Sunny	**DISCARDED ITEMS:** 6 lynch Pins 5 Gal. Fuel (diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: L Amos	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: L. O. Amos	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 40'	LOCATION: A Tank Farm	DATE: 09-17-18	Report #: 56
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN-18-0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # C-9393 Tubing (2½) @ 187 to 227 ft bgs; S.U. 7.3'
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \

Boring # Interval: Type
N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East, pre-job, no fishing at C-9385 because of ground penetrating radar scan
0715	Pre-job concludes, ace in, pick up respiratory gear.
0750	Arrive at A farm, Dress into whites, don SCBA's
0815	Enter farm, move pipe and materials off C-9385 site, inspect rig, drive 2½" tubing from 187' to 199' at C-9393, Head became hot (200° F)
0900	Exit farm, allow head to cool
0945	Dress into whites, don respiratory gear
1000	Enter farm, drive C-9393 from 199' to 211' b.g.s at 15° (from vertical) angle.
1040	Head became hot (203° F) exit farm, survey out equipment
1055	Lunch
1230	Dress into whites, don respiratory gear
1300	Enter farm drive C-9393 from 211' to 227' b.g.s.
1340	Head became hot (195° F) exit farm, survey out return gear to mask station
1410	Return to shop.
1630	End of shift

K.O. 9-17-18

K.O. 9-17-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: RJ Steffler, O. Amos, A. Hoopes, C. Cateson, A. Young	WEATHER/DOWNTIME: 70° sunny	DISCARDED ITEMS: 10 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.J. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 60'	**LOCATION:** A Tank Farm	**DATE:** 09-18-18	**Report #:** 57
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-015
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9393 Tubing (2½") @ 227 to 287 ft bgs; S.U. 7.5'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Arrive at 200 East, pre job
0715	Pre-job cards, pick up respiratory equipment, travel to farm
0805	Dress into whites don respiratory protection
0815	Enter farm, drive C-9393 from 227' to 247'
0900	Head became hot (197° F) exit farm, allow to cool
0950	Dress into whites don SCBAs
1005	Enter farm, fuel rig, drive 2½" tubing at 15° off vertical from 247' to 267' b.g.s
1040	Head became hot (202° F) exit farm survey out equipment
1055	Lunch
1230	Dress into whites, don respiratory protection
1300	Enter farm drive 2½" tubing from 267' to 287' b.g.s. at 15° angle off verticle
1340	Head became hot (215° F.) Exited farm, survey out equipment, return gear to mask station
1410	Return to shop
1630	End of shift
	K.O 9-18-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** R. Steffler, M. Young, C. Cetron	**WEATHER/DOWNTIME:** 73° sunny	**DISCARDED ITEMS:** 10 gals diesel, 7 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 8'	**LOCATION:** A Tank Farm	**DATE:** 9-19-18	**Report #:** 58
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 13245144 18251 / **EXCAVATION PERMIT NO.** DAN18-0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLING SUMMERY

SAMPLE#	INTERVAL:	%
N/A		

BOREHOLE SUMMARY END OF SHIFT KO 9-19-18

Borehole # C9393 Tubing (2½) @ 287' to 295' ft bgs; S.U. 2.2' 2.3 K.O. 9-19-18

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0620	Travel to A farm
0650	Arrive at 200 East pre-job
0720	Pre job concludes, A'ce in, pick up respiratory protection travel to A Farm
0810	Dress into whites, don respiratory protection
0830	Enter farm, drive 2½" tubing at 15° angle off vertical from 287' to 295.1' b.g.s., targeted depth, Tag bottom at 298.3' T.O.C., total pipe string = 298.3', no fill inside tubing, set up equipment and prepare for camera survey.
0930	Exit Farm for bottle change and break
1000	Enter farm and run camera survey, no breaks were detected at this time in tubing, retreive camera, survey out equipment and return gear to mask station.
11:30	Return to shop, plan to run gyroscope survey tommorow A.M.
1630	End of shift

K.O. 9-19-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, C. Catron, P. Lyndsy

WEATHER/DOWNTIME: 79° Sunny

DISCARDED ITEMS: 2 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.J. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 9-20-18	Report #: 59
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole #C-9393 Tubing (2½) @24 to \ ft bgs; S.U. 3.2' Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		GEOPHYSICAL LOGGING Boring # Interval: Type C-9393 295-0' Gyro

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East, pre-job
0715	Pre job concludes, pick up respiratory protection travel to A-Farm, Dress into whites, don respirators
0810	Enter farm, set up and run gyro survey on C-9393, tool traveled to bottom and returned with no hang ups.
1015	Completed survey, put equipment away.
1030	survey out equipment and return gear to mask station
1100	Travel to shop, return data to three rivers scientific to be evaluated
1630	End of shift

K.O. 09-20-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. Steffler, C. Catron, P. Lynday	WEATHER/DOWNTIME: 72° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson TITLE: TEAM COGNIZANT PERSON SIGNATURE: Kelly Olson	REVIEWED BY: RZ Steffler TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 9-24-18	Report #: 60
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	~~18-~~ 18245144 DAN18-0125	~~HHU XL #3~~	~~HHU CAT #4~~
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole #C-9393 Tubing (2½) @ 29⅝ to ft bgs; S.U. 3.2		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		C-9393 292-293 Moisture
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		KO - 9-24-18

TIME	WORK SUMMARY
0615	Travel to 200 East
0630	Arrive at 200 East, Pre-job
0725	Pre job concludes, ace in, pick up respiratory protection, travel to A farm
0800	Dress into whites, don respiratory gear
0815	Enter farm, set up for moisture logging at C-9393, Moved Rig #4 to C-9385 and set up for probe retreival, operators moved pipe and equipment to C-9385 tagged top of probe, begin fishing operations
0925	Begin moisture logging at C-9393, top of Probe tagged at 71.3' T.O.C. at C-9385, installed 50 joints of inner rod and fishing socket (Probe fell to bottom when tool contacted it)
1645	Exit farm for lunch survey out
1100	Lunch
1230	Dress into whites don respiratory protection
1245	Enter farm Run remaining inner rod and fishing tool at C-9385, Pulled inner string and tool retreived part of probe connecter, shut down moisture logging operations and secured equipment.
1410	Exit farm, survey out equipment, return equipment to mask station
1440	Return to shop
1630	End of shift

K.O. 9-24-18

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: O. Amos, C. Catron, A. Hopes, P. Lyndsy	WEATHER/DOWNTIME: 72° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 9-25-18	Report #: 61
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18-0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # C-9393 Tubing (2 1/2") @ 295 to \ ft bgs; S.U. 3.2

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

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

Boring # C-9393 Interval: 292'-63' Type Moisture

TIME	WORK SUMMARY
0615	Travel to 200 west, and travel to 3 rivers scientific for advisment
0650	Arrive at 200 East, pre-job
0715	Pre-job concludes, ace in, pick up respiratory gear, travel to A farm
0800	Dress into whites, don respiratory protection
0815	Enter farm, set up and begin moisture logging at C-9393, set up camera survey on C-9385, camera found gamma probe lodged in break of tubing,
0840	Moisture logging in progress, Exit farm to formulate fishing strategy and let moisture logging continue. Re-running Moisture logging from previous day due to faulty readings (possible cause may have been Canon connecter not making full contact.)
1330	Dress into whites don respiratory gear
1345	Enter farm shut down moisture logging, fuel both rigs
1410	Exit farm, survey out equipment, return gear to mask station
1430	Travel to shop
1630	End of shift
	K.O. 9-25-18

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: A. Hoopes, O. Amos, P. Lyndsy, Z. Nelson, P. Lyndsy	76° Sunny	15 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 9-26-18	Report #: 62
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 (HHU XL #3)	HHU CAT #2 (HHU CAT #4)

SAMPLE# INTERVAL: % — N/A

BOREHOLE SUMMARY END OF SHIFT
Borehole # C-9393 Tubing (2½) @295 to \ ft bgs; S.U. 32'
Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \

GEOPHYSICAL LOGGING
Boring # C-9393 Interval: 63'-0' Type: Moisture

TIME	WORK SUMMARY
0615	Travel to 200 East
0648	Arrive at 200 East, Pre-job meeting
0715	Pre job concludes, Acc in, pick up respiratory equipment, travel to A farm
0800	Dress into whites, don respiratory protection
0815	Enter farm, set up for moisture loggins at C-9393, Resume fishing efforts for gamma probe at C-9385, Re-run 66' to 61' for overlap at C-9393, begin moisture loggins at 8:40 AM, Ran taper tap to top of probe in C-9385 (lodged in break) when contacted probe fell to bottom of hole, fishing tool was ran to bottom (Approx 285') hooked into probe and it was pulled back to break in casing at 76' from T.O.C. where tap came loose but probe remained lodged. Moisture loggins was completed at C-9393 63' to 0'
1040	survey out equipment
1100	Lunch
1230	Dress into whites, don respiratory protection.
1245	Enter farm, ran camera survey, Knocked probe to bottom with "Knocker" bar, rotated casing while viewing with camera to achieve best allignment, turned pipe ¼ turn to left, Ran camera back in and checked top of probe for debris, it was fine, Brought camera back to surface

See page 2 →

OPERATOR/LICENSE: Olson #1217
PERSONNEL: A. Hoopes, O. Amos, C. Catron, Z. Nelson, P. Lynds

WEATHER/DOWNTIME: 80° sunny

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD CONTINUATION

PURPOSE: A Tank Farm Direct Push Vadose Characterization | **DATE:** 9-26-18 | **Report #:** 62

TIME	WORK SUMMARY
1345	Survey out equipment and personel, return gear to mask station
1415	Return to shop
1630	End of shift

K.O. 9-26-18

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 9-27-18	Report #: 63
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN18 0125	HHU XL #3	HHU CAT #4
NA	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # C9393 Tubing (2½) @ to 295 ft bgs; S.U. 3.2'
Borehole # _____ Tubing ( ) @ to ft bgs; S.U. _____
Borehole # _____ Tubing ( ) @ to ft bgs; S.U.

Boring #	Interval:	Type
C9393	295-0	Gyro

TIME	WORK SUMMARY
0600	Plan of the Day
0615	Head to 200 east for pre-job (Gyro hole) #C9393
0700	AT prejob, discussed daily activities (Gyro)
0725	Head to Ace in and go to A Farm
0815	Enter farm to gyro, make two runs on C9393
1115	Exit Farm with equipment.
1140	Head to shop with equipment and drop off at Russ.
1230	back at shop
1430	End of shift.

OPERATOR/LICENSE: Amos 1224
PERSONNEL: Aquila Hoopes
Rick Franzen,
OPS - Chris

WEATHER/DOWNTIME: 78°

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Lyle Amos
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Lyle O. Amos

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 10-1-18	**Report #:** 64
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN18 0125	**HHU XL #3**	**HHU CAT #4**

NA

BOREHOLE SUMMARY END OF SHIFT

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

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

NA

TIME	WORK SUMMARY
0600	No work inside tank farms. Atkins has no contract in place yet and no site badges.
1630	End of shift.

RZS 10-1-18

OPERATOR/LICENSE: Amos 1224

PERSONNEL: RZ Steffler, Mike Weakley, Aquilla Hoopes

WEATHER/DOWNTIME: NA

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler
TITLE : TEAM COGNIZANT PERSON
SIGNATURE: R.Z. Steffler

REVIEWED BY: Aquilla Hoopes
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE:

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 10-2-18	Report #: 65
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU CAT #2 HHU XL #3 HHU CAT #4	
NA	BOREHOLE SUMMARY END OF SHIFT Borehole # NA Tubing ( ) @ to ft bgs; S.U. NA Borehole # Tubing ( ) @ to ft bgs; S.U. Borehole # Tubing ( ) @ to ft bgs; S.U.	GEOPHYSICAL LOGGING Boring # Interval: Type NA	

TIME	WORK SUMMARY
0600	No work inside tank farms. Atkins has no contract in place yet and no site badges.
1630	End of shift.

RZS 10-2-18

OPERATOR/LICENSE: Amos 1224 PERSONNEL: RZ Steffler, Aquilla Hoopes, Mike Weakley	WEATHER/DOWNTIME: NA	DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Rory Z Steffler TITLE : TEAM COGNIZANT PERSON SIGNATURE: R.Z. Steffler	REVIEWED BY: Kelly Olson TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 10/03-18	Report #: 66
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EY-SH-HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # N/A Tubing (\ ) @ \ to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work in tank farms, Atkins has no contract in place, no badges
1500	contract in place, pick up badges at central badging
1630	End of shift

K.O. 10-03-18

OPERATOR/LICENSE: Olson #1217
PERSONNEL: R. Steffler, A. Hoopes, M. Weakley

WEATHER/DOWNTIME: 64° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 10-04-18	Report #: 67
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # N/A 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 N/A	

TIME	WORK SUMMARY
0620	Travel to 200 East
0650	Arrive at 200 East Pre-job
0730	Pre-job concludes, Ace in
0800	No tank farm entry in A.M. due to problems accessing medical records for mask station due to contract change and Crane activity over drill sites.
1215	Dress into whites, don respiratory protection
1230	Enter farm, Rig down Barretta Rig #3 at C-9393 and move rig and equipment to C-9391, set up on C-9391 for decommissioning. Installed inner rod and reaming tool at C-9385 through break at 74' until tool would go through freely, pulled inner rods and reaming tool
1330	Exit farm, survey out equipment, return gear to mask station
1400	Travel to shop
1630	End of Shift
	K.O. 10-04-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, R. Stoffler, O. Amos, P. Lynday, C. Catron, Z. Nelson	WEATHER/DOWNTIME: 63° partly sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson TITLE: TEAM COGNIZANT PERSON SIGNATURE: Kelly Olson	REVIEWED BY: RZ Stoffler TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 10-08-18	Report #: 68
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EI-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (,) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0635	Travel to 200 East
0705	Arrive at 200 East, pre-job,
0725	Pre-job concludes, pick up respiratory protection, ace in travel to 'A' farm
0810	Dress into whites, don respiratory gear
0820	Enter farm, install fishing tool and inner rod at C-9385 in effort to retreive gamma tool, hooked fishing tool into probe, pulled probe to surface, begin clean-up at site (Both sections of Probe were retrieved)
1020	Exit farm, survey out probe and equipment
1045	Lunch
1230	Dress into whites, don respiratory protection
1245	Enter farm, clean inner rod and package in Lancs bag. Secure site
1320	Exit farm, survey out equipment, return gear to mask station, waiting on variance to decommission ~~C-9393~~ RZS 10-17-18 C9391.
1400	Travel to office
1630	End of shift
	K.O. 10-08-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: O. Amos, C. Catron, Z. Taylor,	WEATHER/DOWNTIME: 57° cloudy, showers	DISCARDED ITEMS: 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 10-09-18	Report #: 69
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: GP-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE# INTERVAL: %

N/A

BOREHOLE SUMMARY END OF SHIFT

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

N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Arrive at 200 East, pre-job
0715	Pre-job concludes, no work conducted in tank farms due to wet windy conditions
1630	End of shift

K.O. ~~09~~ 10-09-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catron, P. Lyndsy

WEATHER/DOWNTIME: 58° Rainy Breezy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 140' decommissioned	**LOCATION:** A Tank Farm	**DATE:** 10-10-18	**Report #:** 70
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EF-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-4391 Tubing (2½) @ 279 to 89 ft bgs; S.U. 3'		**Boring #** **Interval:** **Type**
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Arrive at 200 East pre job
0715	Pre-job concludes, Acc in, pick up respiratory protection, travel to A farm, pick up pallet and bentonite
0820	Enter farm, operators move bentonite to site, back pull casing from 180' to 133' b.g.s (180' location of break) filled bottom section of casing with granular bentonite per variance from dept. of ecology
1035	Exit farm, survey out equipment
1055	Lunch
1230	Dress into whites don respiratory protection
1300	Enter farm back pull 2½" casing from 133' to 89' while back filling with granular bentonite
1400	Exit farm, survey out equipment, return gear to mask station
1430	Return to shop
1630	End of shift
	K.O. 10-10-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, C. Catron, Z. taylor, P. Lyndsy	**WEATHER/DOWNTIME:** 62° Sunny	**DISCARDED ITEMS:** 5 sacks Bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 89' pulled	LOCATION: A Tank Farm	DATE: 10-11-18	Report #: 71
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0135	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE# INTERVAL: % — N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2½) @ 89' to 0' ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type — N/A

TIME	WORK SUMMARY
0630	Travel to 200 East
0700	Arrive at 200 East, pre-job
0735	Pre job concludes, Acc in, pick up respiratory protection
0815	Dress into whites don respiratory protection
0835	Enter farm, inspect rig, back pulled remaining 2½" casing from C-9391 while back-filling boring with bentonite crumbles. C-9391 is now decommissioned. Logging tools were calibrated at Cal mods in 200 West area, gamma tool and moisture tools were calibrated.
1055	Exit farm, survey out equipment, return gear to mask station
1130	Travel to office, awaiting direction for next push.
1630	End of shift

K.O. 10-11-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catrons, Z. Taylor, A. Hoopes, O. Amos

WEATHER/DOWNTIME: 65° sunny

DISCARDED ITEMS: 25 Joints 4' drive pipe 2.5", 1 Box x Box 2.5", 1 - Tip holder, 1 - expendable tip, 6 sacks bentonite, 4 rivets

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stoffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 10-15-18	Report #: 72
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: 4X-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 ~~HHU XL #3~~	HHU CAT #2 HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole #C-9395 Tubing (25) @ \ to \ ft bgs; S.U. \

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

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

Boring #	Interval:	Type
C-9385	99-18'	Gamma

TIME	WORK SUMMARY
0600	loading equipment at shop
0640	Travel to 200 East
0710	Arrive at 200 East, Ace in, pick up respiratory protection
0730	Pre-job
0755	Pre job concludes, pick up bentonite at chem storage, travel to A farm
0825	Dress into whites, don respiratory protection
0840	Enter farm, decommissioned lower portion of C-9385, installed granular bentonite from 285.5' to 110, Set up and begin Gamma logging operations, No work on HHU XL#3 in A-M. due to no forklift available to move pipe and 45° Angle plate for move from C-9398 to C-9395.
1230	Fork lift became available, operators pick up forklift and off load 45° angle plate and nails.
1310	Dress into whites, don respiratory protection
1340	Enter farm, NCOs transport plate to site, fold up Rig #3 and move off C-9391, RCTs up post area around C-9395 to access hole, line up angle plate, Gamma logging continue.
1445	Exit farm, gamma logging completed to 17.9', started at 99.5', survey out equipment, return gear to mask station
1500	Travel to shop
1630	End of shift

N/A K.O. 10-15-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, A. Hooper, C. Catron, Z. Taylor	WEATHER/DOWNTIME: 62° sunny	DISCARDED ITEMS: 4 sacks granular bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 45'	LOCATION: A Tank Farm	DATE: 10-16-18	Report #: 73
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245174 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9395 Tubing (2½") @ 0 to 45' ft bgs; S.U. 53' Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type C-9385 17.5-0' Gamma	

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Arrive at 200 East, pre-job, located at 2704 bldg.
0715	Pre-job concludes, Ace in, pick up respiratory gear travel to A farm
0830	Dress into whites don respiratory gear, and sound monitering equip.
0845	Enter farm, Finish placing 45° angle plate at C-9395, Drove retaining rods, placed felt and plastic barrier under rig and set up at 45° angle
1000	Exit farm because of faulty regulator (freezing up), returned equipment to mask station, filled out paperwork and replaced unit.
1050	Lunch
1215	Dress into whites, don respiratory protection
1235	Enter farm, Begin gamma logging at C-9385, NEO's transported 200' of drill string from RMA #12 to C-9395, Drove 2½" tubing from 0' to 45' at 45° (stopped at this point for gyroscope survey) completed gamma logging at C-9385 17.5' to 0.
1430	Exit farm, survey out equipment, return gear to mask station
1500	Return to shop
1630	End of shift
	K.O. 10-16-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Catron, Z. Taylor, P. Lindsy	WEATHER/DOWNTIME: 65° sunny	DISCARDED ITEMS: 3 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ol	SIGNATURE: R.J. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 285.5-0'	LOCATION: A Tank Farm	DATE: 10-17-18	Report #: 74
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SH(-)HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # C-9395 Tubing (2½) @ 45 to \ ft bgs; S.U. 5.3

Borehole # C-9385 Tubing (½) @ 285.5 to 0' ft bgs; S.U. 0'

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

Boring #	Interval:	Type
C-9395	45'-0'	Gyro
C-9393	291'-234'	Gamma

TIME	WORK SUMMARY
0620	Travel to 200 East
0705	Arrive at 200 East, pre-job
0730	Pre-job concludes, Ace in, pick up respiratory protection, travel to A farm
0810	Dress into whites don respiratory protection
0830	Enter farm begin decommissioning on C-9385, Ran gyro survey at C-9395 at 45°, pulled from 76' to 48' at C-9385
0915	Exit farm to obtain more bentonite from chem-storage
1000	Return with bentonite, dress into whites don SCBAs
1015	Enter farm pull 2½" casing in vertical hole C-9385 from 48' to 16' while back-filling with granular bentonite, Gyro survey completed, set up and begin gamma logging on C-9393.
1100	Exit farm, survey out equipment, transport gyro data to 3 rivers scientific for evaluation
1130	Lunch
1230	Dress into whites, don respiratory protection
1245	Enter farm, pull remaining 16' at C-9385 and back-fill with bentonite C-9385 is now fully decommissioned Continue gamma logging at C-9393 fold up rig #4 and clean site, C-9393 gamma logged 291' to 234'
1445	Exit farm, survey out equipment, return gear to mask station
1500	Travel to shop
1630	End of shift

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Catron, Z. Taylor	WEATHER/DOWNTIME: 69° sunny	DISCARDED ITEMS: 6 sacks bentonite, 54 joints 4' x 2½" Rod, 1-Box x Box, 1 Tip holder, 1-expendable tip, 4-rivets

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ol	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 40'	**LOCATION:** A Tank Farm	**DATE:** 10-18-18	**Report #:** 75
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SK-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125		
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9395 Tubing (2½") @ 45 to 85' 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
C-9393	234-153	Gamm

TIME	WORK SUMMARY
0620	Travel to 200 East
0710	Arrive at 200 East, pre-job
0735	Pre-job concludes, Ace in Pick up SCBAs travel to A farm
0750	Hanford patrol closes access to A farm complex due to suspicous activity
0825	Access allowed to A farm, Dress into whites, don SCBA's
0905	Enter Farm, begin gamma logging activity at C-9393, Drive 2½" tubing from 45' to 74' b.g.s at C-9395, NCO's move equipment off C-9385 site and stage near C-9395, Rig #4 is surveyed out of farm and RCTs begin Release survey to transport rig off site
1035	Exit farm, survey out equipment, move rig #4 to parking area to complete Exit survey.
1100	Lunch
1230	Dress into whites, don respiratory protection
1300	Enter farm, Gamma logging continues at C-9393, drive 2½" tubing at 45° angle from 74' to 85' b.g.s., head became hot at that point (200°F), very hard area 79' to 81'
1340	Exit farm, logging continues
1440	C-9393 gamma logging completed from 234' to 153', survey out equipment, return gear to mask station
1500	Return to shop
1630	End of shift

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Catron, Z. Taylor, P. Lyndsy	65° sunny	5 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 73'	LOCATION: A Tank Farm	DATE: 10-22-18	Report #: 76
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SHJHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING

Borehole # C-9395 Tubing (2½") @ 85 to 158 ft bgs; S.U. 4.3'

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

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

GEOPHYSICAL LOGGING: Boring # C-9393 Interval: 153' - 77' Type Gamma

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East, pre-job
0720	Pre-job concludes, Acc in, pick up respiratory protection travel to A farm
0800	Arrive at A-farm, Air bottles delayed, stand by for delivery
0850	Bottles arrive, dress into whites, don respiratory gear
0910	Enter farm, Fuel and inspect Rig, begin gamma logging at C-9393, Drive 2½" tubing from 85' to 130' b.g.s at 45° angle.
1000	Head became hot (197° F), exit farm survey out equipment
1030	Lunch
1230	Dress into whites, don respiratory protection
1300	Enter farm, gamma logging continues, drive 2½" tubing from 130' to 158' b.g.s. at C-9395
1330	Head became hot (200° F) exit farm, return gear to mask station, logging continues, C-9393 gamma logged from 153' - 77'
1430	Exit farm, survey out equipment, return gear to mask station
1500	Return to shop
1630	End of shift
	K.O. 10-22-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, A. Hooper, O. Amos, C. Catron, R. Taylor, P. Lynds	WEATHER/DOWNTIME: 67° sunny	DISCARDED ITEMS: 10 gals diesel, 11 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 39'	LOCATION: A Tank Farm	DATE: 10-23-18	Report #: 77
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9395 Tubing (2½") @ 158 to 196.8 ft bgs; S.U. 5.5' Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # C-9393 Interval: 77-0 Type Gamma	

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Arrive at 200 East, pre-job
0720	Pre job concludes, Acc in, pick up respiratory protection travel to A Farm
0800	Dress into whites, don respiratory protection
0830	Enter farm, begin gamma logging at C-9393, drive C-9395 at 45° with 2½" tubing from ~~185'~~ to 185'
0930	Head became hot (200°F) 158' Exit farm to allow head to cool. survey out equipment.
1000	Lunch
1230	Dress into whites, don respiratory protection
1300	Enter farm, continue gamma logging, drive 2½" tubing from 185' to 196.8' b.g.s. (T.D.), complete gamma logging at C-9393
1400	Survey out logging cart and equipment, exit Farm return gear to mask station
1430	Return logging cart to 3 rivers scientific to obtain measurements
1515	Return to shop
1630	End of shift
	K.O. 10-23-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, A. Hoop, C. Caton, Z. Taylor	WEATHER/DOWNTIME: 63° Partly cloudy	DISCARDED ITEMS: 5 lynch pins 1 nylatrol washer

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 10-24-18	**Report #:** 78
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN-18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**

Borehole # C-9395 Tubing (2 1/2") @ 196'8 to \ ft bgs; S.U. 5.5

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

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

Boring #	Interval:	Type
C-9395	195-0	Gyro

TIME	WORK SUMMARY
0600	Pick up logging cart at 3 rivers scientific
0630	Travel to 200 East
0701	Arrive at 200 East, pre job
0732	Pre-job concludes, Ace in, pick up respiratory protection, travel to 'A' farm
0804	Dress into whites, don respiratory protection
0833	Enter farm, set up and run Gyro survey at C-9395 at 45° angle from 195' to 0'
1042	Exit farm, survey out equipment, return gear to mask station
1120	Return to shop. Rig #4 was also picked up by Peters and Keates and transported to town.
1630	End of shift

K.O. 10-24-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** A. Hoopes, O. Amos, O. Cotron, Z. Taylor	**WEATHER/DOWNTIME:** 63° partly sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 10-25-18	Report #: 79
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 025 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		C-9395 197-/ moisture
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
6:00	loading 2 5/8" pipe at yard, gather equipment
6:30	Travel to 200 East
0705	Arrive at 200 East, pre-job
0735	Pre job concludes, Ace in, pick up respiratory protection, travel to A farm and stand by for NCO's to pick up fork-lift inside 'e' farm and transport to site.
0900	Fork lift on site, Dress into whites, don SCBA's
0915	Enter farm, Make site to site move from C-9395 to C-9386 with Rig #3, NCO's move 2 5/8" sampling rod (75 joints with inner rod) and tooling and equipment to C-9386. No logging activities were conducted because of moving equipment at C-9395
1015	Rig #3 is set up on sample hole C-9386, pipe is in place, exit farm, survey out equipment, return gear to mask station. (Note- C-9386 located 3' south of C-9385)
1100	Return to shop
1630	End of shift
	K.O. 10-25-18

OPERATOR/LICENSE: Olson PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Catron, P. Lyndsy, Z. Taylor	WEATHER/DOWNTIME: 65° partly sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.J. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 10-29-18	Report #: 80
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-AHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

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

N/A

TIME	WORK SUMMARY
0600	No work conducted in tank farms due to physical examinations and Berrilium training
1630	End of shift

K.O. 10-28-18

OPERATOR/LICENSE: Olson #127 PERSONNEL: O. Amos, A. Hoopes, M. Weakley	WEATHER/DOWNTIME: 63° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 10-~~26~~ 30-18	**Report #:** 81
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ETSH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# INTERVAL: %	18245144 DAN 18 ~~825~~ 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	Boring # C-9395	Interval: 194-0 Type Moisture
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Arrive at 200 East, pre-job
0720	Pre-job concludes, acc in, pick up respiratory protection, travel to A-farm
0805	Dress into whites, don respiratory protection
0827	Enter farm, set up and begin moisture logging at C-9395 at 45° angle
1402	Moisture logging completed, moisture tool did not stop at '0' footage and came to top of casing with security lock and damaged footage encoder, surveyed cart and tools out of farm and returned gear to mask station.
1501	Return equipment to 3 rivers scientific for repairs.
1535	Drop off equipment, return to shop
1630	End of shift

K.O. 10-29-18

OPERATOR/LICENSE: Olson #1217
PERSONNEL: O. Amos, M. Weakley, A. Hoopes, C. Catron, Z. Taylor

WEATHER/DOWNTIME: 62° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 10-31-18	Report #: 82
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18-0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No logging activity conducted in tank farms due to repairs being made at 3 rivers scientific to logging equipment, No drilling or sampling activity scheduled to start at this time
1630	End of shift

K.O. 10-31-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weekley, A. Hoopes O. Amos	WEATHER/DOWNTIME: 62° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 11-1-18	Report #: 83
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN-18-0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9386 Tubing (2 5/8") @ 0 to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No logging activity in tank Farms while repairs being made to logging equipment. No drilling or sampling scheduled for this date.
1630	End of shift

RZS 11-1-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: A. Hoopes, O. Amos, M. Weakley	WEATHER/DOWNTIME: 620 sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: \	LOCATION: A Tank Farm	DATE: 11-5-18	Report #: 84
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4

SAMPLE#	INTERVAL:	%
B3L2V4	Surface	100
B3L2V6	" "	100

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9386 Tubing (2 5/8) @ 0 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9395	194-125	Gamma

TIME	WORK SUMMARY
0620	Travel to 200 East
0701	Arrive at 200 East, pre job
0735	Pre job concludes, pick up respiratory protection, Acc in travel to A Farm
0800	Dress into whites, don respiratory protection, NCO's picking up fuel
0850	Enter farm, set up for gamma logging at C-9395
0959	Begin gamma logging at C-9395, operators enter farm and collect surface sample # B3L2V4 and duplicate # B3L2V6, NCO's exit farm, process samples and deliver to Labs.
1100	Lunch
1240	Dress into whites, don respiratory protection
1305	Enter farm, set up and prepared for driving 2 5/8" sampling string at C-9386, gamma logging was performed at C-9395 from 194' to 125', survey out equipment and return gear to mask station
1450	Return to office
1630	End of shift

K.O. 11-5-18

OPERATOR/LICENSE: Olson # 1217

PERSONNEL: M. Weakley, R. Steffler, C. Catron, Z. Taylor

WEATHER/DOWNTIME: 60° mostly sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 14'	LOCATION: A Tank Farm	DATE: 11-6-18	Report #: 85
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: E7-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18-0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE#	INTERVAL:	%
C-9386 1001	7-9'	shoe 100, A 100, B 100, C 75%
C-9386 1002	12-14'	see below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9386 Tubing (2 5/8) @ 0' to 14' ft bgs; S.U. 4.3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9395	128-46	Gamma

TIME	WORK SUMMARY
0615	Travel to 200 East
0704	Arrive at 200 East, pre-job
0731	Pre-job concludes, Ace in pick up SCBA's, travel to 'A' Farm
0800	Dress into whites, don respiratory protection
0816	Enter farm, begin gamma logging at C-9395 at 45° angle, Drive 2 5/8" tubing from 0' to 7' at C-9386, pull tip, install sampler, drive sampler from 7' to 9' at 0902 AM
	Results were Shoe B3K515 = 100%, 'A' liner B3K512 = 100%, 'B' liner B3K513 = 100%, 'C' liner B3K514 = 75% (all moist)
	Install tip, drive to next sample depth (12') pull tip, install sampler, ~~drive sampler from 12' to 14' bgs at 1234~~ K.O. 11-6-18
1035	Exit farm survey out equipmen
1050	Lunch
1215	Dress into whites, don respiratory protection
1225	Enter farm drive sampler from 12' to 14' at 12:34 P.M.
	Install tip, secure site
1302	Exit farm, survey out equipment, process sample;
	Results were Shoe B3K522 = 100% 'A' liner B3K519 = 100%
	'B' liner B3K520 = 100% 'C' liner B3K521 = 50% (all moist)
1431	Logging completed for day, Exit farm, return scan to mask station
1502	Return to shop
1630	End of shift

K.O. 11-6-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, R. Steffler, C. Catron, Z. Taylor, Z. Olson	WEATHER/DOWNTIME: 64° mostly sunny	DISCARDED ITEMS: 6 sample liners, 12 sample caps, 2 'O' rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 11-7-18	**Report #:** 86
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EFSH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN-18-0125	**HHU XL #3**	**HHU CAT #4**
NA	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C9386 **Tubing** (2 3/8) @ 0 **to** 14 **ft bgs; S.U.** 4.3		**Boring #** C9395 **Interval:** 48.5-0 **Type** Gamma
	Borehole # / **Tubing** (/) @ / **to** / **ft bgs; S.U.** /		
	Borehole # / **Tubing** (/) @ / **to** / **ft bgs; S.U.** /		

TIME	WORK SUMMARY
0610	Travel to 2704HV, 200 East area.
0657	Pre job meeting.
0718	Pre job complete. Logging today. No pushing.
0750	At A Farm. Prepping for entry.
0822	Began pre verify check.
0832	Began overlap and repeat from 48.51 ft.
0853	Began logging. Exited farm.
1135	Reentered farm.
1142	Began post survey.
1200	Exited farm with all logging materials. Dropped off SCBA equipment and returned to shop.

RZS 11-7-18

OPERATOR/LICENSE: NA
PERSONNEL: RZ Steffler

WEATHER/DOWNTIME: Clear / Sunny

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: R.Z. Steffler

REVIEWED BY: ACUILA HERRES
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE:

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 39'	LOCATION: A Tank Farm	DATE: 11-8-18	Report #: 87
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 180125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole #C-9386 Tubing (2 5/8") @ 14' to 53' 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 N/A

TIME	WORK SUMMARY
0610	Travel to 200 East
0695	Arrive at 200 East, pre-job
0730	Pre job concludes, ace in, pick up respiratory equipment
0805	Dress into whites, don respiratory protection
0830	Enter farm, drive 2 5/8" sampling string from 14' to 37' b.s.s.
0915	Exit farm for bottle change and thaw icing regulators
0945	Dress into whites don respiratory protection
1000	Enter farm, drive 2 5/8" sample string at C-9386 from 37' to 53' b.s.s. (next sample point), stopped there because labs unable to receive sample until Monday.
1040	Exit farm, survey out equipment, return gear to mask station
1100	Return to office
1630	End of shift

K.O. 11-8-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Catron, Z. taylor, H. young, D. Lee Curtus	WEATHER/DOWNTIME: 53° mostly sunny	DISCARDED ITEMS: 1 Jaw die 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 22'	LOCATION: A Tank Farm	DATE: 11-12-18	Report #: 88
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
B3K528	53-55	100
B3K527		100
B3K526		100
B3K529		50

BOREHOLE SUMMARY END OF SHIFT
Borehole # C-9386 Tubing (2 5/8) @ 53 to 75' 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
N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East, Pre-job
0730	Pre job concludes, Acc in, pick up respiratory protection travel to A farm
0810	Dress into whites, don Scba's
0830	Enter farm, inspect rig, pull inner rod and tip assembly, install inner rod and sampler to sample depth (53')
0920	Exit farm, survey out equipment, return racks to mask station and change out for new equipment due to freezing regulators
0945	Lunch
1145	Dress into whites don respiratory protection
1200	Enter farm, drive sample at C-9386 from 53' to 55' at 1202 Pm, results from the sample were shoe B3K529 = 50%, A-liner B3K526 = 100%, B liner B3K527 = 100%, C liner B3K528 = 100%, install inner rod, drive 2 5/8" tubing from 55' to 61' bgs,
1230	Exit farm, change bottles, thaw regulators
1320	Dress into whites don SCBAs
1335	Enter farm drive 2 5/8" tubing from 61' to 75' (sample depth) Operators also completed equipment blank sample #s B3M4C9, and B3K585
1430	Survey out equipment, return gear to mask station
1630	End of shift

K.O. 11-12-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. Steffler, C. Catron, P. Lyndsy, D. Curtis	WEATHER/DOWNTIME: 35° Fog	DISCARDED ITEMS: 1 Lynch pins 3 sample liners 6 sample caps 2-O Rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: ~~20~~ 22'	LOCATION: A Tank Farm	DATE: 11-13-18	Report #: 89
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA 005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
B3K536	75-77'	75%
B3K535		100%
B3K534		100%
B3K533		100%

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9386 Tubing (2 5/8) @ 75' to 97' 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
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Arrive at 200 East, pre-job
0720	Pre job concludes, Acc in, pick up respiratory gear Travel to A farm
0800	Dress into whites, don SCBA's, operators perform equipment blanks
0827	Enter farm, Pull inner rod and tip at C-9386, install sampler to depth (75') and set up to drive
0915	Survey out equipment, return racks to Mask station and swap for new ones (Regulators icing up)
0945	Dress into whites, Don SCBAs
0957	Enter farm drive from 75' to 77', results were shoe B3K536 75%, A liner B3K533 100%, B liner B3K534 100%, C liner B3K535 100%, Back pulled two 2' sections used to obtain sample of 2 5/8" outer rod, installed tip to shoe (77')
1035	Exit farm, survey out equipment (operators processing sample)
1115	Lunch
1304	Dress into whites, don respiratory protection
1316	Enter farm, drive 2 5/8" sampling string from 77' to 97' b.g.s., secure site
1403	Exit farm, survey out equipment, return gear to mask station.
1630	End of shift
	(Note) - ~~Equipment~~ Field blank samples were ~~BM~~ B3M400 & B3K584 K.O. 11-13-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Catron, D. Curtis, P. Lyndsy, Z. Taylor, M. Young	WEATHER/DOWNTIME: 32° Foggy	DISCARDED ITEMS: 6 sample caps, 3 sample liners, 4" O rings, 2 4 inch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 11-14-18	Report #: 90
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-003
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C4336 Tubing (2 5/8) @ 97 to \ 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

N/A

TIME	WORK SUMMARY
0600	No work conducted in tank farms, not on work schedule due to training and time-off for Key personell.
1630	End of shift

K.O. 11-13-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley

WEATHER/DOWNTIME: 43° cloudy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 11-15-18	Report #: 91
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C9386 Tubing (2 5/8) @ 97' to ft bgs; S.U. 1.3		Boring # Interval: Type
	Borehole # Tubing ( ) @ to ft bgs; S.U.		N/A
	Borehole # Tubing ( ) @ to ft bgs; S.U.		

TIME	WORK SUMMARY
0600	No work in tank farms due to recourses being assigned to higher priority work and training
1630	End of shift

K.O. 11-15-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: N/A	WEATHER/DOWNTIME: 45° Partly sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 35'	LOCATION: A Tank Farm	DATE: 11-19-18	Report #: 92
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-3HA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9386 Tubing (2 5/8) @ 97' to 132' 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 N/A	

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East pre-job
0725	Pre-job concludes, Ace in, pick up respiratory protection
0815	Dress into whites, don SCBA equipment
0842	Enter farm, Fuel rig, drive 2 5/8" dual sampling string from 97' to 121' bgs
0950	Ran out of air, exit farm to allow scba equipment to thaw, survey out
1003	Lunch
1215	Dress into whites, don SCBAs
1230	Enter farm drive 2 5/8" tubing from 121' to 132' bgs (sample depth)
1315	Exit farm at hold point for sampling due to lab support survey out equipment, return gear to mask station
1330	Return to shop
1630	End of shift

K.O. 11-19-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. Steffler, M. Weakley, C. Cutron, 2 Taylor, D. Curtis	WEATHER/DOWNTIME: 33° foggy	DISCARDED ITEMS: 2 lynch pins 10 gal diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson TITLE: TEAM COGNIZANT PERSON SIGNATURE: Kelly Olson	REVIEWED BY: RZ Steffler TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 11-20-18	Report #: 93
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX 063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 (HHU XL #3)	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C9386 Tubing (2 5/8) @ 132 to \ 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 N/A	

TIME	WORK SUMMARY
0600	No work conducted in tank farms due to no support from labs for sampling during Thanksgiving holiday
1630	End of shift
	K.O. 11-20-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL:	WEATHER/DOWNTIME: 34° Foggy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 2'	LOCATION: A Tank Farm	DATE: 11-26-18	Report #: ~~93~~ 94
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-05
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
	18245144 DAN-18-0125	HHU XL #3	HHU CAT #4

SAMPLE#	INTERVAL:	%
B3K543	132-134	75
B3K540		100
B3K541		100
B3K542		100

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4386 Tubing (2½) @ 132 to 134 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Arrive at 200 East, pre-job
0716	Pre-job concludes, are in, pick up respiratory protection, travel to A farm
0803	Dress into whites don respiratory protection
0831	Enter farm, Pull inner rod and tip, install sampler to sample depth 132'
0933	Exit farm, allow regulators to thaw
1000	Enter farm, drive sample at 10, pull sampler, operators took sample for processing.
1102	Survey out, personnel and equipment
1115	Lunch
1304	Dress into whites, don respiratory protection,
1320	Enter farm, re-install tip and inner rod, set up to continue driving. Results from processed sample are shoe # B3K543 = 75%, A-liner # B3K540 = 100%, B-liner # B3K541 = 100%, C-liner # B3K542 = 100%, all samples were damp
1402	Exit farm, survey out equipment, return gear to mask station
1420	Return to shop
1630	End of shift
	K.O 11-26-18

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: R. Steffler, C. Catron, H. Youngs	40° Rain	1 3" allen bolt, 6 sample caps, 3 sample liner 3'0" PPE

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

ATKINS

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 11-27-18	Report #: 95 ~~94~~
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SMA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # 2C-03386 Tubing (2 3/8) @ 134 to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0615	Travel to 200 East
0648	Arrive at 200 East, pre-job
0713	Pre-job concludes, sec in, pick up respiratory gear, travel to A-farm
0800	Meet at A-farm, assess weather conditions
0900	No work conducted in tank farm due to rainy conditions return gear to mask station, return to shop
1630	End of shift

K.O 11-27-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. steffler, J. Corton, Z. Taylor, P. Lyndsey, D. Coates	WEATHER/DOWNTIME: 45° Rain	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson TITLE: TEAM COGNIZANT PERSON SIGNATURE: Kelly Olson	REVIEWED BY: RZ Steffler TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 51'	LOCATION: A Tank Farm	DATE: 11-28-18	Report #: ~~95~~ 96
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # L-9386 Tubing (2 5/8) @ 134 to 185 ft bgs; S.U. 1.3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0615	Travel to 200 East
0645	Arrive at 200 East, pre-job
0712	Pre job concludes, Acc in, pick up respiratory protection travel to A-farm
0805	Dress into whites, don respiratory protection
0817	Enter farm, inspect rig, drive 2 5/8" sample string from 134' to ~~185'~~ to 153' b.g.s, Exit farm to thaw regulators.
0914	Survey out
0945	Dress into whites, don SCBA's
1002	Enter Farm, drive 2 5/8 tubing from 153' to 173' b.g.s
1050	Ran out of air, exit farm, survey out equipment
1115	Lunch
1232	Dress into whites don SCBAs
1300	Enter farm, drive 2 5/8 tubing from 173' to 185' b.g.s.
1351	Head became hot, exit farm
1400	Survey out equipment, return gear to mask station
1420	Return to shop
1630	End of shift
	K.O. 11-28-18

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: M. Weakley, Z. taylor, D. Curtis, P. Lynsy	WEATHER/DOWNTIME: 42° foggy	DISCARDED ITEMS: 9 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ol	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 11-29-18	Report #: ~~96~~ 97
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 -0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-4386 Tubing (2 5/8) @185 to \ ft bgs; S.U. 1.3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work conducted in tank farms due to training and ~~working~~ no waiting on parts.
1630	End of shift

K.O. 11-29-16

OPERATOR/LICENSE: Olson #1217 PERSONNEL:	WEATHER/DOWNTIME: 50° cloudy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ol	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 12-3-18	Report #: ~~97~~ 98
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-3MA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole #C-9386 Tubing (2⅝) @185 to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0615	Travel to 200 East
0653	Arrive at 200 East pre-job
0720	Pick up respiratory equipment, ace in, travel to A-farm
0805	Work stopped on all work evolutions with an anticipated contamination >40,000 DPM / 100 cm2 beta or 72,000 DPM / 100 cm2 alpha until SID has been updated to establish beryllium issue threshold (POC), sent out by central shift office.
1630	End of shift

K.O. 12-3-18

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: M. Weakley, D. Curtis, Z. Taylor, P. Lynday	36° Foggy	N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 12-4-18	Report #: ~~98~~ 99
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0123	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # E9385 Tubing (2 5/8) @ 185 to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 west area
0645	Arrive at 200 East area pre-job
0720	Pre-job concludes, Ace in, pick up respiratory protection travel to A farm
0805	Stop work for RWP problems, return to WRPS offices, stand by to see if issues can be corrected
1003	Return gear to mask station, travel to shop RWP issues not resolved.
1630	End of shift

12-4-18

OPERATOR/LICENSE: Olson #1217
PERSONNEL: C. Catron, D. Curtis, Z. Taylor, P. Lyndsy, M. Weekley

WEATHER/DOWNTIME: 34° partly sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 12-5-18	Report #: 99 100
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU CAT #2 HHU XL #3 HHU CAT #4	

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9386 Tubing (2 5/8) @ 185 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
6:00	No work conducted in Tank farms due to RWP issues
1630	End of shift

K.O. 12-5-18

OPERATOR/LICENSE: Olson #1217 PERSONNEL:	WEATHER/DOWNTIME: 33° cloudy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stettler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 12-6-18	Report #: 101
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SW-HA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9386 Tubing (2 5/8) @ 185 to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0600	standing by for RWP issues to be resolved, no work conducted in tank farms.
1630	End of shift

K.O. 12-6-18

OPERATOR/LICENSE: Kelly Olson PERSONNEL: M. Weakley	WEATHER/DOWNTIME: 33° cloudy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 8	LOCATION: A Tank Farm	DATE: 12-10-18	Report #: 102
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EI-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #5	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9386 Tubing (2 5/8) @ 185 to 193 ft bgs; S.U. 5	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0850	PROVE TO SIMURF TO ATTEND PREJOB AT RICKS OFFICE FOR A FARM WORK SCOPE
0920	ARRIVED AT A FARM. CURRENTLY WAITING FOR FEILD
0940	SUPPORT TO ARRIVE.
1030	ENTERED FARM, RESTRUCTURED DRILL STRING WITH NEW DRILL PIPE (3.8 FT) THIS WILL ALLOW BETTER ACCES TO THE INNER STRING USING PIPE WRENCHES. WAS ABLE TO PUSH 3 FT SETTING UP FOR NEXT JOINT.
1030	EXITED FARM.
1215	ENTERED FARM TO CONTINUE DRIVING TO NEXT SAMPLE LOCATION
1330	STOPPED DRIVING PIPE. CURRENT DEPTH 193 FT BGS. HEAD UP AND EXITED FARM.
1630	END SHIFT

AH 12/10/18

OPERATOR/LICENSE: Olson #127

PERSONNEL: AQUILA HOLDES, MIKE WEEKLY

WEATHER/DOWNTIME: N/A

DISCARDED ITEMS: 2 LYNCH PINS

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 17'	LOCATION: A Tank Farm	DATE: 12-11-18	Report #: 103
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 / PAN 180125	HHU XL #3	HHU CAT #4
NA	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C9386 Tubing (2 5/8) @ 193 to 210' ft bgs; S.U. 4'		Boring # Interval: Type
	Borehole # — Tubing (—) @ — to — ft bgs; S.U. —		NA
	Borehole # — Tubing (—) @ — to — ft bgs; S.U. —		

TIME	WORK SUMMARY
0610	Drove to 2704 HV for pre job meeting.
0650	Pre job. Discussed APR's and mask/glasses. Weather could be a factor. Require plastic for inner rod protection.
0710	Pre job complete. ACE in and check out equipment.
0810	Enter farm to resume driving.
0925	Exit farm. Ran out of air. Currently at 208' bgs. Extremely hard driving from ≈ 185 to 200' bgs.
0950	Re-enter farm and continued driving to sample depth of 210'.
1000	Began pulling inner rod.
1040	Inner rod extracted.
1045	Exit A Farm. Lunch.
1240	Re-enter A Farm. Attached sampler and began tripping in inner rod.
1325	Ready to drive sampler. Exit A Farm and returned equipment to 2704 HV.
1415	Return to shop.

RZS 12-11-18

OPERATOR/LICENSE: Amos 1224 PERSONNEL: RZ Steffler Olin Amos	WEATHER/DOWNTIME: Fog / Cold	DISCARDED ITEMS: HHT Lynch Pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler	REVIEWED BY: Josh Bonderman
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler	SIGNATURE: Josh Bonderman

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 30'	LOCATION: A Tank Farm	DATE: 12-12-18	Report #: 104
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063 Rev3.	AHA: ES FH-SHA-005
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 / DAN 180125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE# INTERVAL: % 210 - ~~220~~ 212 100%
B3K550 - Shoe 100%
B3K547 - A - 100%
B3K548 - B - 100%
B3K549 - C - 100%

BOREHOLE SUMMARY END OF SHIFT
Borehole # C9386 Tubing (2 5/8 @ 210 to 240 ft bgs; S.U. 6.2'
Borehole # — Tubing (—) @ — to — ft bgs; S.U. —
Borehole # — Tubing (—) @ — to — ft bgs; S.U. —

GEOPHYSICAL LOGGING
Boring # Interval: Type
NA

TIME	WORK SUMMARY
0610	Drive to 2704 for prejob meeting.
0645	Prejob. Discussed taking sample and stop work Authority.
0705	Ace in and pickup Mack + Rack
0745	Dress in and enter Farm, fuel rig and check oils
0810	Start Rig and let warm up.
0820	Drive Sample from 210 to 212 Feet.
0823	Pull inner rods and sampler
0845	Bottle change then finish pulling sampler
0900	Sample out
0905	Trip in dummy tip and inner rods
0945	Exit zone for break rods on bottom
1005	Dress in and begin driving 2 5/8" rods
1020	Driving Rods
1053	Exit Farm for lunch (at 225')
1110	lunch
1215	Dress into zone
1230	Drive 2 5/8"
1330	out of zone at 240 feet bgs.
1400	Return to shop

OPERATOR/LICENSE: Amos 1224 PERSONNEL: mike weakley	WEATHER/DOWNTIME: Sunny / warm 47°	DISCARDED ITEMS: 7-Lynch Pins 2-O-rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: LO AMOS
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Lo A. Amos

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 23 FT	LOCATION: A Tank Farm	DATE: 12/13/18	Report #: 105
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AR-063 REV 3	AHA: ES FH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 / DAN 180125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # 19386 Tubing (25/8 @ 240 to 263 ft bgs; S.U. 1' Borehole # ____ Tubing ( ) @ to ft bgs; S.U. ____ Borehole # ____ Tubing ( ) @ to ft bgs; S.U.	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0610	DRIVE TO 2704 PRE JOB MEETING
0650	DISCUSSED DRIVING TO SAMPLE DEPTH / SAMPLE MONDAY
0705	ACED IN AND RACK AND MASK PICKUP
0725	ARRIVED AT A FARM WAITING FOR FIELD SUPPORT
0830	DRESSED DOWN ENTERED FARM
0920	DROVE PIPE FROM 240 - 252, EXITED FARM
0940	DRESSED DOWN SECOND FARM ENTRY
1040	DROVE PIPE FROM 252 - 258, EXITED FARM
1100	LUNCH
1237	DRESSED DOWN ENTERED FARM
1250	EXITED FARM DROVE PIPE FROM 258 - 263, NEXT SAMPLE LOCATION
1300	RETURN TO SHOP.
1630	END OF SHIFT

N/A 12/13/18

OPERATOR/LICENSE: OLSON #127 PERSONNEL: ARMILA HOOPES MIKE WEEKLY	WEATHER/DOWNTIME: CLOUDY / WARM 46°	DISCARDED ITEMS: 3 LYNCH PINS

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Armila Hoopes
TITLE: TEAM COGNIZANT PERSON
SIGNATURE:

REVIEWED BY: R.J. Schiffl
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.J. Schiffl

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 12-~~16~~17-18	**Report #:** 106
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.** 18245144 DAN 18 0125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9386 Tubing (2 5/8) @ 263 to \ ft bgs; S.U. 1'

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

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

GEOPHYSICAL LOGGING

Boring # **Interval:** **Type**

N/A

TIME	WORK SUMMARY
0610	Travel to 200 East
0650	Pre-job
0722	Pre-job concludes, Ace in pick up respiratory protection, travel to A-farm, Dress into whites, don respiratory protection
0825	Enter farm, inspect rig, Pull out 180' of inner rod, found 'Box' joint broken on top of 184' joint.
0920	Exit farm, Survey out equipment, bring fishing tool from shop.
10:00	Lunch
1215	Dress into whites, don respiratory protection
1230	Enter farm, install fishing socket, connect to broken rod, pull inner rod and tip (required one bottle change).
1406	Exit farm, survey out equipment, return gear to mask station.
1428	Return to shop
1630	End of shift

K.O. 12-~~16~~17-18

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catron, P. Lyndsy, D. Curtis, Z. Taylor

WEATHER/DOWNTIME: 45° sunny

DISCARDED ITEMS: 2 inner rod

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 2	**LOCATION:** A Tank Farm	**DATE:** 12-18-18	**Report #:** 107
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-065
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 DAN 18 0125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE#	INTERVAL:	%
Shoe	265-264.5	100%
A liner	264.5-264	100%
B liner	264-263.5	100%
C liner	263.5-263	100%

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4386 Tubing (2 5/8) @ 263 to 265 ft bgs; S.U. 1.1

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
	N/A	

TIME	WORK SUMMARY
0610	Travel to 200 East
0644	Arrive at 200 East, pre-job
0703	Pre-job concludes, Acc in, pick up SCBA equipment, travel to A Farm
0756	Dress into whites, don respiratory protection
0812	Enter Farm, begin tripping in sampler and inner rod
0840	200' of inner rod tripped in, Exit farm for rainy conditions
0921	Showers stopped, dress into whites, don SCBA's,
0938	Enter Farm, finish installing inner rod and sampler to 263' b.g.s., make up 2 5/8" coupler head, add 2' joint.
0951	Drive sampler from 263' to 265' b.g.s.
0957	Pull sampler and inner rod to surface (with one bottle change).
1052	Secure site exit farm, NCO's processing sample
1131	Results of sample are Shoe B3K557 = 100%, A liner B3K554 = 100%, B liner B3K555 = 100%, C liner B3K556 = 100%
1135	Lunch
1208	Entered advanced AOP008 (winds over 25 MPH)
1230	Return gear to mask station, travel to shop
1630	End of Shift
	K.O. 12-18-18

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, C. Catron, P. Lyndsy, Z. Taylor, D. Curtis	**WEATHER/DOWNTIME:** Windy, Rain showers 57°	**DISCARDED ITEMS:** 1-Lynch pin, 6-sample caps, 3-sample liners, 3 'O' rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 8'	**LOCATION:** A Tank Farm	**DATE:** 12-19-18	**Report #:** 108
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18-0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9386 **Tubing** 2 5/8 @ 265 to 273 ft bgs; **S.U.** 1.2'		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\ ) @ \ to \ ft bgs; **S.U.** \		N/A
	Borehole # \ **Tubing** (\ ) @ \ to \ ft bgs; **S.U.** \		

TIME	WORK SUMMARY
0612	Travel to 200 East
0645	Arrive at 200 East, pre-job
0720	Pre-job concludes, Ace in, pick up respiratory gear, travel to A farm
0813	Dress into whites, don respiratory gear
0820	Enter Farm, back-pull 2 5/8" casing to remove two 2' sections of pipe, install inner rod to 262', Re-push to 265'
0915	Ran out of air, exit farm, let regulator un-thaw.
0943	Dress into whites, don respiratory protection
1008	Enter farm, drive 2 5/8" sample string from 265' to 273' b.g.s. (sample point). Hold at that point, labs not accepting samples during holiday.
1052	Exit farm, survey out equipment, return gear to mask station.
1204	Return to shop

K.O. 12-19-18

OPERATOR/LICENSE: Olson # 1217 **PERSONNEL:** R. Steffler, C. Catron, Z. Taylor, P. Lyndsy	**WEATHER/DOWNTIME:** 45° cloudy	**DISCARDED ITEMS:** 1 lynch pin 2 'O' rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 12-20-18	Report #: 109
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18-0125	HHU XL #3	HHU CAT #4
NA	BOREHOLE SUMMARY END OF SHIFT Borehole # C9386 Tubing (2 3/8) @ to 273' 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 NA	

TIME	WORK SUMMARY
0600	Arrive at shop. Load supplies and hitch trailer.
0830	Travel to 200W. Area.
0900	Begin set up of cart # 2 on well 699-48-77A.
0935	Begin depth calibration on cart #2 with the assisstance of Three Rivers Scientific.
1112	Completed depth calibration. Lunch.
1215	Return to the shop. Dropped off logging cart and equipment at Three Rivers Scientific.
1630	End of shift.

RZS 12-20-18

OPERATOR/LICENSE: 1217 PERSONNEL: RZ Steffler Kelly Olson	WEATHER/DOWNTIME: Calm / 40's	DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler	REVIEWED BY: Kelly Olson
TITLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R. J. Steffler	SIGNATURE: Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 12-26-18	**Report #:** 110
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.** 18245144 / DAN 18-0125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9386 Tubing (2 7/8) @ to 273' 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**

NA

TIME	WORK SUMMARY
0600	Arrive at shop.
0730	Travel to 2704 HV.
0830	Pre job. Just recovering pipe rack from RMA 12
0915	Obtained 1 rack from the paint building area.
0925	At RMA 12. Restacked and consolidated piping in order to get two more racks.
1030	Two racks surveyed for release.
1045	Returned to shop.
1133	Lunch.
1630	End of shift.

RZS
12-26-18

OPERATOR/LICENSE: 1217

PERSONNEL: RZ Steffler, Mike Weakley

WEATHER/DOWNTIME: Not a factor

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Steffler

REVIEWED BY: Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 12-27-18	**Report #:** 111
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SA-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 / DAN 18-0125	**HHU XL #3**	**HHU CAT #4**
NA	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # C9386 **Tubing** (2 5/8) **@** **to** 273' **ft bgs; S.U.** 1.2'	**Boring #** **Interval:** **Type**	
	Borehole # _____ **Tubing** ( ) **@** **to** **ft bgs; S.U.** _____	NA	
	Borehole # **Tubing** ( ) **@** **to** **ft bgs; S.U.**		

TIME	WORK SUMMARY
0730	No work inside tank farm due to holiday schedule and lack of Atkins resources.
1630	End of shift.

RZS 12-27-18

OPERATOR/LICENSE: 1217 **PERSONNEL:** RZ Steffler Mike Weakley	**WEATHER/DOWNTIME:** NA	**DISCARDED ITEMS:** NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler	**REVIEWED BY:** Kelly Olson
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler	**SIGNATURE:** Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 12-31-18	**Report #:** 112
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SA-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18-0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT** **Borehole #** C9386 **Tubing** (2 5/8) @ **to** 273 **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** N/A	

TIME	WORK SUMMARY
0600	ARRIVED AT SHOP
0700	TRAVEL TO 2704 HV
0830	PRE JOB FOR INNER STRING REMOVAL
0915	~~RIGS~~ ENTERED FARM
1000	MADE TWO ENTRIES AND PULLED INNER STRING FOR SAMPLE ON WEDNESDAY
1020	RETURNED BACKS HEADING BACK TO SHOP.
1100	LUNCH
1630	END OF SHIFT
	AH 12/31/18

OPERATOR/LICENSE: **PERSONNEL:** AQUILA HORNES MIKE WEASLY	**WEATHER/DOWNTIME:** NOT A FACTOR	**DISCARDED ITEMS:** 7 GALLONS OF FUEL

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: AQUILA HORNES	**REVIEWED BY:** RZ Stoffler
TITLE : TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE:	**SIGNATURE:** R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 4'	**LOCATION:** A Tank Farm	**DATE:** 01-02-19	**Report #:** 113
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-HA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 19245144 DAN 18 0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE#	INTERVAL:	%
1	273-275	
2	275-277	

(see below for results)

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9386 Tubing (2 5/8) @ 273 to 277 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
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0640	Arrive at 200 East, pre-Job
0720	Change out dosimetry. Ace in, pick up respiratory protection
0815	Dress into whites, don SCBAs
0830	Enter Farm, install sampler and inner rod to 273' bgs, Drove sampler at 0925, pulled sampler and NCO's begin processing sample, installed second sampler and inner rod and drove second sample from 275' to 277', pulled sampler to surface to be processed. (see sample results below). Two drill teams were utilized to achieve continues operations.
1145	Exit Farm, survey out equipment
1205	lunch
	Sample results, sample #1 (273'-275'), shoe B3K564 = 100%, A liner B3K561 = 100%, B liner B3K562 = 100%, C liner B3K563 = 100%, all samples were moist
	Sample #2 (275'-277'), shoe B3K571 = 25%, A liner B3K568 = 100%, B liner B3K569 = 100%, C liner B3K570 = 95%, all samples were moist.
1336	Dress into whites
1347	Enter Farm, put away pipe, clean up, secure site.
1420	Exit farm survey out, return ~~scort~~ gear to mask station
1450	Return to shop
1630	End of shift

OPERATOR/LICENSE: K. Olson #1211

PERSONNEL: R. Steffler, M. Wackley, J. Bankerman, O. Amos, C. Catron, Z. Taylor, R. Lindsy

WEATHER/DOWNTIME: 35° partly cloudy

DISCARDED ITEMS: 6 sample liners, 12 sample caps, 3 Tyvecs

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TLE : TEAM COGNIZANT PERSON

GNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 77' pulled	**LOCATION:** A Tank Farm	**DATE:** 01-03-19	**Report #:** 114
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-0149-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144 DAN 18-0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9386 Tubing (2 5/8) @ 277' to 200' ft bgs; S.U. 2.2'		**Boring #** **Interval:** **Type**
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0645	Pre-job
0720	Prejob concludes, Area in, power problems at mask station, mask station closed, stand by to re-open
0805	Mask station open, pick up respiratory protection, pick up bentonite at chem-storage, travel to A farm
0836	Dress into whites, don SCBAs.
0852	Enter farm, back-pull 2 5/8" casing from 277' to 241', pco's deliver bentonite to site via Forklift.
0947	Exit farm survey out equipment, check on area north of site for postings and barricades to get 300' tas tape stored there.
1012	Lunch
1215	Dress into whites, don SCBA's
1242	Enter farm, located tas tape, back pulled 2 5/8" casing from 241' to 200' b.s.s while back filling with granular bentonite
1338	Exit farm, survey out equipment, return gear to mask station
1420	Return to shop
1630	End of shift
	K.O. 01-03-19

OPERATOR/LICENSE: Olson # 127 **PERSONNEL:** M. Weakley, C. Catron, Z. Taylor, D.L. Curtis, P. Lindsy	**WEATHER/DOWNTIME:** 46° showers	**DISCARDED ITEMS:** 3 sacks bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE: ATKINS TECHNICAL REVIEWER**
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 01-07-19	Report #: 115
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9386 Tubing (2 5/8") @ 200 to \ 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
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0650	Pre job at 200 East area
0721	Pre job concludes, Acc in, pick up respiratory equipment
0750	Vadose work cancelled due to support being pulled to another project with higher priority.
0800	Return gear to mask station, acc out, return to shop
1630	End of shift

K.O. 01-07-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, J. Bordeaux, Z. Taylor, C. Catron, D. Curtis	WEATHER/DOWNTIME: 43° Breezy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 100' Pulled	LOCATION: A Tank Farm	DATE: 01-08-19	Report #: 116
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: GT-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-9386 Tubing (2 5/8) @200 to 100' ft bgs; S.U. 2.2		Boring # Interval: Type
	Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0642	Pre-job meeting
0715	Pre-job concludes, Ace in, pick up respiratory gear, travel to A-farm
0814	Dress into whites, Don SCBAs
0831	Enter farm, back pull 2 5/8" casing from 200' to 148' b.s.s., back filling with granular bentonite
0916	Exit for bottle change and allow regulators on SCBA's to de-frost, survey out equipment
0950	Dress into whites, don SCBA's
1003	Enter farm, back-pull 2 5/8" casing from 148' to 100 b.s.s. while back filling with bentonite.
1051	Exit farm, survey out equipment
1114	Return gear to mask station, Ace out
1200	No entry in afternoon due to deteriorating weather conditions
1630	End of shift
	K.O. 01-08-19

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: M. Weakley, J. Bonderman, C. Catron, Z. Taylor, P. Lindsey	WEATHER/DOWNTIME: 36° mixed rain & snow	DISCARDED ITEMS: 5 sacks bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 95' pulled	LOCATION: A Tank Farm	DATE: 01-09-19	Report #: 117
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 Dan 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9386 Tubing (2 5/8) @ 100 to 5' ft bgs; S.U. 2.3'	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0612	Travel to 200 East
0643	Arrive at 200 East, pre-job meeting
0720	Pre-job concludes, Ace in, pick up respiratory protection
	Travel to A farm, Operators pick up 'Gator' and
	move 6 sacks of bentonite to site.
0840	Dress into whites, don SCBA's
0906	Enter farm, back-pull 2 5/8" casing from 100' to 49' b.g.s.
1001	Exit farm, survey out equipment
1025	Lunch
1215	Dress into whites, don SCBA's
1240	Enter farm, back pull 2 5/8" casing from 49' to 5' b.g.s.
	(ran out of bentonite at that point) Lube and inspect rig
1336	Exit farm, survey out equipment, return gear to
	mask station and Ace out
1410	Return to shop
1630	End of shift
	K.O. 01-09-19

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: M. Weakley, Z. Taylor, P. Lynsy, C. Catron, D. Curtis	WEATHER/DOWNTIME: 40° cloudy	DISCARDED ITEMS: 6 sacks bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 5' pulled	**LOCATION:** A Tank Farm	**DATE:** 01-10-19	**Report #:** 118
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-4386 Tubing (2 1/2) @ 5' to 0' ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East, Transported 75 Joints new 2 1/2" pipe
0646	Arrive at 200 East, pre job meeting
0731	Pre-job concludes, Acc in, pick up respiratory protection travel to A-farm, Operators pick up fork lift
0829	Move new 2 1/2" pipe, bentonite and fuel into farm, fuel rig
0842	Dress into whites, don SCBA's
0907	Enter farm, back pull 2 1/2" casing from 5' to 0', back-fill with bentonite fold up rig, move rig back near C-9391 for Re-drive of 30° (off vertical) boring. Operators moving pipe and equipment, RCT's up-posted area to allow set-up.
1003	Exit farm, survey out equipment
1020	Lunch
1215	Operators enter farm, move pipe out of C-9391 location, move tools and equipment to other site.
1302	Drill crew enters farm, un-bolt Angle guide from ground plate at C-9391, set up rig and pull one nail.
1350	Exit farm, Acc out, survey out equipment, return gear to mask station
1421	Return to shop
1630	End of shift
	K.O. 01-10-19

OPERATOR/LICENSE: Kelly Olson #1217 **PERSONNEL:** M. Weckler & J. Bonderman Z. Taylor, C. Catron	**WEATHER/DOWNTIME:** 50° cloudy	**DISCARDED ITEMS:** 1 sack bentonite 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 01-14-19	**Report #:** 119
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 **Tubing** (2½") @ 0 **to** \ **ft bgs; S.U.** \		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		N/A
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0615	Travel to 200 west area
0655	Arrive at 200 west, Pre-job
0720	Pre-job concludes, ace in, pick up respiratory protection
0816	Air bottles arrive, dress into white, don SCBAs
0832	Enter farm, complete pulling nails (3) at C-9391-A, move plate 2' East, begin leveling plate and drove 2 nails.
0923	Exit farm, survey out equipment, allow SCBA equipment to un-thaw
0950	Dress in whites, don SCBAs
1003	Enter farm, drive last 2 nails in plate at C-9391, install and level top cap of plate
1031	Exit farm, survey out equipment
1050	Lunch
1235	Dress into whites, don SCBAs
1252	Enter farm, operators moved Rack of 2½" drill string, tools and ground cover to C-9391, set up Rig #3 on C-9391 at 30° off vertical angle.
1341	Exit farm, survey out equipment, Ace out, return gear to mask station
1403	Return to shop
1630	End of shift
	K.O. 01-14-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. weakley, R. Steffler, C. Cetron, Z. taylor, P. Lydy	**WEATHER/DOWNTIME:** 36° Foggy	**DISCARDED ITEMS:** 1 sack bentonite (for nail holes)

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 51.7'	**LOCATION:** A Tank Farm	**DATE:** 01-15-19	**Report #:** 120
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18-0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**

Borehole # C-9391 Tubing (2½) @ 0 to 51.7 ft bgs; S.U. 2.6'

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

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

Boring #	Interval:	Type
C-9391	0' – \	Gyro

TIME	WORK SUMMARY
0610	Travel to 200 East, fuel pick-up
0723	Arrive at 200 East, pre job
0725	Pre-job concludes, stand-by for dosemitry, pick up SCBAs
0814	Arrive at 'A' farm, Ace in, dress into whites, don SCBAs
0836	Enter farm, inspect rig, drive 2½" casing at C-9391 at 30° angle off vertical from 0' to 51.7' b.g.s.
0928	Exit farm, stopping at 51.7' for Gyro run
0943	Dress into whites, don SCBA's, enter farm and set-up for Gyro run
1035	Exit farm, survey out equipment
1046	Lunch
1215	Return to tank farm, stop work issued for Beryllium issues, Enter farm and secure site.
1250	Return gear to mask station, ace out, travel to office
1630	End of shift

K.O. 01-15-19

OPERATOR/LICENSE: K. Olson #1217

PERSONNEL: M. Weakley, R. Steffler, J. Bonderman, C. Catron, P. Lynday, D. Ohlman, Z. Taylor

WEATHER/DOWNTIME: 35° cloudy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 01-16-19	Report #: 121
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE# INTERVAL: % — N/A

BOREHOLE SUMMARY END OF SHIFT
Borehole # C-9391 Tubing (2½") @ 51.7 to \ ft bgs; S.U. 2.6, 1.3
Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9391	51'-0'	Gyro

TIME	WORK SUMMARY
0612	Travel to 200 East
0646	Arrive at 200 East pre-job
0711	Pre-job concludes, lee in, pick up respiratory protection
0806	Dress into whites, don SCBAs
0921	Enter farm, perform 30 minute warm up and completed 3 gyro runs, Pick up equipment, secure site.
0947	Survey out logging cart and equipment
1025	Attempt to transmit data from 200 East, un-able to do so because of security systems.
1135	Return to office, deliver Gyro Data to three Rivers Scientific, stand by for results in order to continue advancing C-9391
1630	End of shift

K.O. 01-16-19

OPERATOR/LICENSE: Olson #1217
PERSONNEL: M. Weakley, R. Steffler, C. Catron, Z. Nelson, P. Lyndsy

WEATHER/DOWNTIME: 35° cloudy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 67'	**LOCATION:** A Tank Farm	**DATE:** 01-17-19	**Report #:** 122
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JKA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-939 Tubing (2½") @ 52 to 119 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
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0646	Arrive at 200 East, Pre-job
0719	Pre-job concludes, Acc in, pick up SCBAs, wait for rain showers to stop.
0835	Dress into whites, Don SCBAs
0842	Enter farm drive 2½" tubing at 30° angle (off vertical) from 52' to 79' B.g.s.
0938	Exit farm due to Rain, survey out equipment
0950	Lunch & stand-by for showers to abate
1314	Dress into whites, don SCBA's
1235	Enter farm, drive 2½" drill pipe from 79' to 119' b.g.s. at 30° angle (off of vertical)
1320	Head became hot (198° F) exit zone, survey out equipment, return gear to mask station
1400	Return to shop
1630	End of shift
	(Note: harder areas 59'-61' and 114'-117')
	K.O. 01-17-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weekley, K. Catron, J. Bonderman, P. Lynds, Z. Nelson

WEATHER/DOWNTIME: 42° Showers

DISCARDED ITEMS: 4 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 01-21-19	**Report #:** 123
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 Dan 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # C-9391 Tubing (2½") @ 119 to \ ft bgs; S.U. 2.3'	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work conducted at tank farm due to no licensed driller available due to whole body count schedule. Calibrated CeBr logging tool at Cal-mods.
1630	End of shift

K.O. 01-21-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weekley, J. Bonderman, R. Steffler	**WEATHER/DOWNTIME:** Clear 40°	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 56'	LOCATION: A Tank Farm	DATE: 01-22-19	Report #: 124
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN-18-0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9391 Tubing (2½) @ 119' to 175' ft bgs; S.U. 33' Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
06:15	Travel to 200 East
06:47	Arrive at 200 East, pre-job
07:23	Pre-job concludes, ace in, pick up respiratory protection, travel to A farm, stand by for air bottles
09:15	Air bottles arrive, dress into whites, don SCBA's
09:28	Enter farm, drive 2½" drill rod from 119' to 159' b.g.s. at 30° angle off vertical
10:18	Exit farm, survey out equipment
10:35	Lunch
12:31	Dress into whites, don SCBA's
12:46	Enter farm, drive 2½" pipe from 159' to 175' b.g.s.
13:37	Exit farm, Head over-heated and rain showers survey out equipment
14:01	Return gear to mask station, ace out travel to shop
16:30	End of shift
	(Note - harder formation 152'-168' b.g.s.)
	K.O. 01-22-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Cafroy, Z. Nelson, J. Ortman	WEATHER/DOWNTIME: 39° showers	DISCARDED ITEMS: 5 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 48'	LOCATION: A Tank Farm	DATE: 01-23-19	Report #: 125
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN-18-0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9391 Tubing (2½) @ 175 to 223' ft bgs; S.U. 33 Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0610	Travel to 200 East
0642	Arrive at 200 East, Pre-job meeting
0714	Pre-job concludes, acc in, pick up respiratory protection, travel to A-farm
0830	Air bottles arrive, dress into whites don SCBA's
0843	Enter farm, drive 2½" drive pipe from 175' to 207' b.g.s. at 30° angle off of vertical at C-9391
0940	Exit farm, head over-heated and change trailer closed for Crane activity, survey out equipment.
1005	Lunch and stand by for Crane activity
1301	Crane activity concluded, dress into whites, don SCBA's
1318	Enter farm drive 2½" pipe from 207' to 223' b.g.s.
1352	Exit farm, survey out equipment, return gear to mask station travel to shop
1630	End of shift
	Note! (Harder area 218' to 223')
	K.O. 01-23-19

OPERATOR/LICENSE: K. Olson #1217 PERSONNEL: M. Weakley, J. Bonderman, Z. Nelson, C. Catron, P. Lyndsy	WEATHER/DOWNTIME: 50° Breezy	DISCARDED ITEMS: 10 gals diesel 4 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ol	SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 24'	**LOCATION:** A Tank Farm	**DATE:** 01-24-19	**Report #:** 126
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN-18-0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 Tubing (2½) @223 to 247 ft bgs; S.U. 3.3		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0613	Travel to 200 East
0645	Arrive at 200 East, pre-job
0714	Pre job concludes, Acc in, pick up respiratory protection, travel to A farm
0810	Dress into whites, don respiratory protection
0832	Enter farm, drive 2½" tubing at C-9391 from 223' to 235' b.g.s, at 30° angle off vertical
0914	Head became hot (200°F), Exit farm, survey out equipment
0950	Lunch
1231	Dress into whites don SCBAs
1253	Enter farm, drive 2½" tubing from 235' to 247' b.g.s.
1342	Head became hot, exit farm, survey out equipment, return gear to mask station
1415	Return to shop
1630	End of shift
	Note: (hard formation 223' to 246')
	K.O. 01-24-19

OPERATOR/LICENSE: Olson #217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weakley, J. Bonderman, C. Catron,	50° sunny	5 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stettler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 31.7'	LOCATION: A Tank Farm	DATE: 01-28-19	Report #: 127
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9391 Tubing (2 1/2") @ 247 to 267' ft bgs; S.U. 3.6'	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to 278.7' ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0615	Travel to 200 East
0650	Arrive at 200 East, pre-job
0718	Pre-job concludes, ace in, pick up respiratory protection travel to A farm, wait for change trailer (tent, normal building closed for power outage) to clear somewhat
0840	Dress into whites, don SCBA's
0854	Enter farm, inspect rig, drive 2 1/2" tubing from 247' to 267' b.g.s.
0943	Head became hot (196°), exit farm, survey out equipment
1005	Lunch
1231	Dress into whites, don Scba's
1242	Enter farm, drive 2 1/2" tubing at 30° angle off of vertical at C-9391 from 267' to 278.7' (T.D. Depth)
1336	Exit farm, survey out equipment, return gear to mask station
1403	Return to office
1630	End of shift

K.O. 01-28-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, M. Weakley, C. Catron, Z. Nelson, P. Lynday	WEATHER/DOWNTIME: 43° Cloudy	DISCARDED ITEMS: 10 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 01-29-19	Report #: 128
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18-0125	HHU XL #3	HHU CAT #4

N/A

B3M595 surface 100%

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing (2 1/2") @ 278.7 to \ ft bgs; S.U. 3.6'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9391	~~Gyro~~ 279-0'	Gyro

TIME	WORK SUMMARY
0614	Travel to 200 East
0653	Pre-job starts (operators to surface sample at C-9394 while camera and gyro runs done at C-9391)
0720	Pre-job concludes, Acc in, pick up respiratory protection
0750	Drop off equipment at East site
0855	Enter farm to perform camera run
0920	Exit farm, un-able to locate generator
1003	Attempted camera survey, no video on screen
1028	Exit farm after setting up for Gyro run.
1230	Re-entered farm
1253	Started gyro warm up, after warm up, ran to bottom pausing every 20', warm up and run was 1 hr, 18 min. Gyro became stuck at approximately 91'
1425	Exit farm, survey out, return gear to mask station
1440	Return to office Note: NCO's collected surface sample B3M595 at C-9394, 2 500 ml containers
1630	End of shift
	K.O. 01-29-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. Steffler, M. Weakley, J. Bonderman, C. Cotton, Z. [illegible], P. Lindsey, J. ORTMAN	WEATHER/DOWNTIME: 40° cloudy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 1-30-19	Report #: 129
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # C-9391 Tubing (2.2") @ 279' to ft bgs; S.U. 3.6'
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \

Boring #	Interval:	Type
C-9391	279-0'	Gyro

TIME	WORK SUMMARY
0612	Travel to 200 East
0643	Arrive at 200 East, pre-job
0712	Pre-job Concludes for camera survey and Gyro runs
	Acc in, pick up respiratory protection
0738	Drop off camera equipment at east gate
0827	Enter zone, inspected Gyro tool, appeared that it may have
	caught on outer lip at top of unit. Set up and ran
	camera survey, camera survey inconclusive, joints appeared good.
0920	Re-installed Gyro tool and begin 30 minute warm-up
0930	Exit survey, let respiratory equipment thaw and gyro warm-up.
1003	Enter zone, perform Gyro run 279 to 0', tool hung up at
	109' and 93'
1100	Exit zone, survey out equipment
1110	Lunch
1235	Dress into whites, don respiratory protection
1251	Enter zone, secured site, waiting for data to be
	interrupted by three rivers scientific to see if
	3rd gyro run needed
1332	Exit form, ace out, return gear to mask station.
1350	Travel to shop, load 2 5/8 sample pipe for C-9394
1630	End of shift
	K.O. 1-30-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, R. Steffler, C. Cafron, Z. Nelson, P. Lyndsy, J. Ortman	WEATHER/DOWNTIME: 35° cloudy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ol	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 01-31-19	**Report #:** 130
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA 005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	(HHU XL #3)	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 Tubing (2½") @ 278.7 to \ ft bgs; S.U. 3.6'		Boring # Interval: Type
	Borehole # C-9394 Tubing (2⅝) @ 0' to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0613	Travel to 200 East
0643	Arrive at 200 East - pre-job
0709	Pre-job over, Ace in, pick up respiratory protection, travel to A-farm
0807	Operators off load rack of 2⅝" sample pipe from pick-up, load plate for Angle drives and take to east gate
0823	Dress into whites, don respiratory protection
0850	Enter farm, put away gyro equipment and fold up Rig at C-9391, NCO's move plate and drill string to C-9394 area. Level plate for C-9394, drive 2 retaining nails.
0940	Out of air, exit farm for bottle change and SCBA de-frosting.
1003	Re-enter farm, drive remaing 2 retaining nails, attach 15° off vertical top cap and set up rig on C-9394, NCO's moved pipe string into position.
1050	Exit farm, survey out equipment
1106	Return to office, no work in farm due to crane activity and high rad work taking place
1630	End of shift
	K.O. 01-31-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** R. Steffler, C. Catron, P. Lynsy, J. Ortman, Dawn-leigh Curtis	**WEATHER/DOWNTIME:** 35° cloudy	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 02-04-19	Report #: 131
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8) @ 0 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9391	276 - 256	Gamma

TIME	WORK SUMMARY
0612	Travel to 200 East
0650	Arrive at 200 East, pre-job meeting
0722	Pre-job concludes, Ace in, pick up respiratory protection, travel to A farm
0802	Dress into whites; don SCBA's
0827	Enter farm, Drill crew completes set up and make up first joint of 2 5/8" dual wall drive pipe, No driving of pipe, stand by for approved work platform to tighten lock screw for inner pipe, at C-9394 (15° angle off vertical) Logging crew set up and begin gamma logging at C-9391.
0940	Exit farm, survey out equipment, logging in progress.
1232	Tank farms entered AOP-17, shut down for winter weather
1256	Entered farm, stopped gamma logging, found logging data had stopped at 256, pull up tools, secure site
1340	Exit farm, survey out equipment, return gear to mask station, return to office
1630	End of shift

K.O. 02-04-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, R. Steffler, J. Borderman, C. Cutrch, Z. Nelson, D. Curtis, P. Lynday

WEATHER/DOWNTIME: 32° snow flurries

DISCARDED ITEMS: 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 02-05-19	Report #: 132
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18-0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-4394 Tubing (2 5/8) @ 0 to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	Work delay at Hanford due to weather (snow)
0930	Work delay over
0945	Travel to 200 East
1031	Arrive at 200 East, pre-job
1055	Pre-job concludes, Lunch
1231	Operators enter farm and bring logging cart to East gate
1324	Logging cart survey and loaded, return logging cart to shop for modifications to be made at GTM machine shop to prevent tooling from hanging up at rod joints.
	No sampling activity in farm due to snow conditions and waiting on platform for performing work making up joints on 2 5/8" sample string
1630	End of shift
	K.O. 02-05-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bordenman, C. Catron, Z. Nelson, Plynsky	WEATHER/DOWNTIME: 28° cloudy snow flurries	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 02-06-19	Report #: 133
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-009
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 180125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-4394 Tubing (2 3/8) @ 0 to ft bgs; S.U.	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work done in tank farms due to no working platform, snow removal done and modifacations being done to loggsing equipment
1630	End of shift

K.O. 02-07-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL:	WEATHER/DOWNTIME: 25° clear	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stettler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 02-07-19	Report #: 134
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9394 Tubing (2 5/8) @ 0' to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Pre-job meeting
0713	Stop-work issued due to freezing problems on SCBA equipment.
0725	Picked up 2 5/8" pipe to begin cleaning for future work
1630	End of shift

K.O. 02-07-19

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: J. Bonderman, C. Catron, M. Weakley, Z. Nelson, P. Curtis, P. Lynds	WEATHER/DOWNTIME: -3° clear - cold	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 02-11-19	Report #: 135
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8) @ 0' to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	No work performed at tank farms due to Hanford site closure for all non-essential personel due to winter storm.
1630	End of shift

K.O. 02-11-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: N/A

WEATHER/DOWNTIME: 25° snow flurries

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stettler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 02-12-19	Report #: 136
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. 1 / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 PAN-18-0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing ( ) @ 0 to ft bgs; S.U. ____

Borehole # \ Tubing (2 5/8) @ \ to \ ft bgs; S.U. \

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	No work done in tank farms, standing by for snow removal.
1630	End of shift

K.O. 02-12-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: N/A

WEATHER/DOWNTIME: 28° cloudy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 02-13-19	Report #: 137
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-OHA-065
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 Dan 18-0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9394 Tubing (2 5/8) @ 0 to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	Hanford site shut down to adverse weather conditions
1630	End of shift

K.O. 02-13-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL:	WEATHER/DOWNTIME: 32° snow, sleet	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 02-14-19	Report #: 138
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 DAN 18-0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9394 Tubing (2 7/8) @ 0 to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0615	Travel to 200 East area
0650	Pre-job meeting at 200 East
0720	Pre-job meeting concluded, Operators concentrating on snow removal around cargo trailer and sampling van. No logging or direct push work performed in tank farms, waiting on snow removal and better weather conditions. Farms still under AOP-17
1630	End of shift

K.O. 02-14-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, R. Steffler	WEATHER/DOWNTIME: 31° snow - sleet	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 02-18-19	Report #: 139
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: E1-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. 1 / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN-18-0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-4334 Tubing (2 5/8) @ 0 to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work conducted in tank farms due to Presidents day holiday being observed by WRPS employees
1630	End of shift

K.O. 02-19-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: N/A	WEATHER/DOWNTIME: 32° mostly sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stettler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 7'	LOCATION: A Tank Farm	DATE: 02-19-19	Report #: 140
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-HA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9344 Tubing (2 5/8) @ 0 to 7' ft bgs; S.U. 3.3' Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		GEOPHYSICAL LOGGING Boring # Interval: Type N/A

TIME	WORK SUMMARY
0611	Travel to 200 East
0643	Arrive at 200 East, pre-job meeting
0721	Pre job concludes, Ace in, pick up respiratory protection
0845	Operators making path to rig with forklift and clearing snow
0932	Dressing into whites, don SCBA's
0937	Enter farm, inspect rig, drive 2 5/8" sample string from 0' to 7' B.G.S. (1st sample depth). Stop at this point with intention of pulling sample tommorrow.
1038	Exit farm, survey out equipment, return scar to mask station
1105	Return to office
1630	End of shift

K.O 02-19-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, M. Weakley, C. Cutron, Z. Nelson	WEATHER/DOWNTIME: 32°, mostly cloudy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 21'	**LOCATION:** A Tank Farm	**DATE:** 02-20-19	**Report #:** 141
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 DAN 18 0125	**HHU CASE #1** (HHU XL #3)	**HHU CAT #2** **HHU CAT #4**

SAMPLE#	INTERVAL:	%
#1	7'-9'	see
#2	12'-14	below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8) @ 7' to 28' 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
	N/A	

TIME	WORK SUMMARY
0610	Travel to 200 East
0642	Arrive at 200 East, pre-job meeting
0722	Pre-job concludes, Ace in, pick up respiratory protection travel to A Farm
0800	Stand-by for air bottle delivery
0855	Air bottles arrive, dress into whites, don SCBA's
0913	Enter farm, back pull inner rod, install sampler and drive sample #1 from 7' to 9' b.g.s at 0922, see results below. Pulled sampler, installed inner rod and tip drove 2 5/8" sample string from 9' to 12', pulled inner rod, installed sampler and drove sample #2 from 12' to 14' at 0951, pulled sampler and NCOs processed both. Results were: SAMPLE #1 A Liner B3M546 = 100% B liner B3M5B5 = 50% C liner B3M5B6 = 25%, SHOE ~~B02563~~ = 100% B3M5B7 SAMPLE #2 A liner B3M5C1 = 100%, B liner B3M5C2 = 95% C liner B3M5C3 = 100%, shoe B3M5C4 = 100%
1014	Exit farm, survey out equipment
1045	Lunch
1230	Dress into whites, don SCBAs
1302	Enter farm, back pull 2' section, drive dual wall string from 14 to 28' B.G.S., secure site.
1353	Exit farm, survey out equipment, return gear to Mask st.
1417	Return to office
1630	End of shift.

OPERATOR/LICENSE: Olson #1217

PERSONNEL: J. Bonderman, M. Weakley, C. Catron, Z. Nelson, J. Ortman, P. Lyndsy

WEATHER/DOWNTIME: 35° mostly sunny

DISCARDED ITEMS: 6 sample liners, 12 sample caps, 1-O Ring, 1-lynch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 20'	**LOCATION:** A Tank Farm	**DATE:** 02-21-19	**Report #:** 142
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SK-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 012J	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9394 Tubing (2 5/8) @ 28' to 48' ft bgs; S.U. 2.3'		Boring # C-9394 Interval: 0-48' Type Gyro
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0611	Travel to 200 East
0643	Arrive at 200 East, pre job
0721	Pre job concludes, Ace in, pick up respiratory protection
0730	Off load logging cart at Evaporator gate, drop trailer
0801	Stand by for air bottles
0850	Air bottles delivered, dress into whites, don SCBA's
0906	Enter farm, inspect rig, drive 2 5/8" sample string from 28' to 48' at 15° off vertical angle, stop at 48' for Gyro survey, begin pulling inner rod and tip, (5 joints).
1003	Exit farm, survey out.
1016	Lunch
1214	Press into whites, don SCBAs
1227	Enter farm, pull remaining inner rod and tip, set up for Gyro survey.
1302	Begin 30 minute warm up for Gyro
1334	30 minute warm up complete, Ran four Gyro runs.
1435	Exit farm, survey out equipment, return gear to mask station
1505	Return to shop, complete paperwork etc.
1630	End of shift
	K.O. 02-21-19

OPERATOR/LICENSE: Olson # 1217 **PERSONNEL:** M. Weakley, C. Catron, R. Steffler, Z. Nelson	**WEATHER/DOWNTIME:** 34° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 02-25-19	Report #: 143
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: % N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING

Borehole # C-9394 Tubing (2 5/8) @ 48 to \ ft bgs; S.U. 2.3'
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \

Boring # Interval: Type
N/A

TIME	WORK SUMMARY
0600	Work delay at Hanford site due to weather conditions
0930	Work delay over, Travel to 200 East
1007	Pre-job meeting
1031	Pre job concludes, Ace in, pick up respiratory protection
1050	Lunch
1200	stand-by for air bottles at 'A' farm, due to scheduling issues no air bottles delivered at 'A' farm for Vadose operations
1305	Cancel job due to weather and no bottle delivery return gear to mask station
1332	Return to shop
1630	End of shift

K.O. 02-25-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, C. Catron, M. Weakley, Z. Nelson, J. Ortman	WEATHER/DOWNTIME: 31° Blowing snow, drifting	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 12'	**LOCATION:** A Tank Farm	**DATE:** 02-26-19	**Report #:** 144
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SHJHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	~~HHU CASE #1~~	HHU CAT #2
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	**BOREHOLE SUMMARY END OF SHIFT** Borehole # C-4394 Tubing (2 5/8") @ 48' to 60' 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 N/A	

TIME	WORK SUMMARY
0600	Delayed start for Hanford due to snow fall
0831	Travel to 200 East
0946	Arrive at 200 East, pre-job
1031	Pre-job concludes, Ace in, pick up respiratory protection
	Off load work platform
1103	Lunch
1204	Dress into whites, don SCBAs
1231	Enter farm, Neo's enter farm and work on snow removal
	at C-9391 for up-coming logging operations, Drill crew
	installed inner rod and tip, drove 2 5/8" sample string
	from 48' to 60' b.g.s.
1328	Exit farm, survey out equipment, return gear to mask
	station
1402	Travel to shop
1630	End of shift
	K.O. 02-26-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** J. Bonderman, M. Weakley, C. Caton, Z. Nelson, P. Lynsy, J. Ortman	**WEATHER/DOWNTIME:** 24° mostly sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 36'	LOCATION: A Tank Farm	DATE: 02-27-19	Report #: 145
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH(-)HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0725	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE# INTERVAL: % — N/A

BOREHOLE SUMMARY END OF SHIFT
Borehole # C-9394 Tubing (2 5/8") @ 60 to 96' 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
N/A

TIME	WORK SUMMARY
0610	Travel to 200 East
0702	Arrive at 200 East, pre-job
0731	Pre-job concludes, Ace in, pick up respiratory protection travel to A farm
0840	Dress into whites, Don SCBAs
0906	Enter farm, Drive 2 5/8" sample string from 60' to 96' b.g.s at 15° angle off of vertical.
1015	Exit farm for inclement weather conditions, survey out equipment, return gear to mask station
1056	Return to shop, no work performed in afternoon due to weather conditions.
1630	End of shift

K.O. 02-27-19

OPERATOR/LICENSE: Olson #1217
PERSONNEL: J. Benderman, M. Weakley, R. Steffler, P. Lynsy, C. Catron, J. Ostman

WEATHER/DOWNTIME: 28° Snow flurries

DISCARDED ITEMS: 3 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 02-28-19	Report #: 146
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245194 DAN 18 0125	HHU CASE #1 (HHU XL #3)	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-4394 Tubing (2 5/8 @ 96' to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0600	Work delay for snowy conditions
0930	Work delay ended, no work performed in tank farms due to no operator available for HHU rig operation
1630	End of shift

K.O: 02-28-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL:	WEATHER/DOWNTIME: 32° clear	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson TITLE: TEAM COGNIZANT PERSON SIGNATURE: Kelly Olson	REVIEWED BY: RZ Steffler TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 20'	LOCATION: A Tank Farm	DATE: 03-04-19	Report #: 147
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: 4X-063	AHA: E-7-SH-JHA-605
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
1 107-109 See below	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole #C4394 Tubing (2 5/8) @ 96 to 116 ft bgs; S.U. 2.3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0644	Arrive at 200 East, pre-job
0723	Pre job concludes, Ace in pick up respiratory protection
0754	Dress into whites, don SCBA's
0810	Enter farm, inspect rig, drive 2 5/8" sample string from 96' to 107' b.g.s, sample depth, pull inner rod and tip, install sampler, drive sampler from 107' to 109' at 15° off vertical pull samplers for NCO's to process
1045	Exit farm, survey out, sample results were shoe B3M5D8 = 75% A liner - B3M5C8 = 100%, B liner B3M5D9 = 100%, C liner B3M5D0 = 100%
1103	Lunch
1233	Dress into whites, don SCBAs
1249	Enter farm, back pull 2 2' casings, and one 1' casing, install tip and inner rod, drive 2 5/8" sample string from 109' to 116' b.g.s., secure site.
1346	Exit Farm, survey out equipment, return gear to mask
1406	Travel to shop
1630	End of shift
	03-04-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, J. Bordonaro, R. Steffler, C. Catron, D. Curtis, J. Ortman, Z. Nelson, P. Lynsy	WEATHER/DOWNTIME: 12° partly cloudy	DISCARDED ITEMS: 7 sacks diesel 2-O rings 3 sample liners 6 sample caps

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 30'	LOCATION: A Tank Farm	DATE: 03-05-19	Report #: 148
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9394 Tubing (2 5/8") @ 116 to 146' ft bgs; S.U. 2.3'	Boring # Interval: Type	
	Borehole # \ Tubing (\) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0606	Travel to 200 East
0640	Arrive at 200 East, pre job
0718	Pre job concludes, see in, pick up respiratory protection
0800	Stand-by for Air bottles
0825	Air bottles arrive, dress into whites don SCBA
0841	Enter farm, drive 2 5/8" sample string from 116' to 146' b.g.s. at 15° angle off vertical (146 = sample depth) attempted gamma logging but had equipment problems, no logging completed
0943	Exit farm, survey out equipment
1006	Lunch
1203	Dress into whites, don SCBA's
1232	Enter farm, pull inner rod at C-9394, pulled ~~and~~ out probe at C-9391 and secured both sites, Cold weather suspected in failure of logging equipment
1312	Exit farm, survey out equipment, return scsr to mask station, Ace out.
1350	Travel to shop
1630	End of shift
	K.O. 03-05-19

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: M. Weakley, J. Bonderman, C. Catron, P. Lynn, Z. Nelson, J. Oltman	WEATHER/DOWNTIME: 3° Cold	DISCARDED ITEMS: 2 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 3'	LOCATION: A Tank Farm	DATE: 03-06-19	Report #: 149
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
146-148' see below			

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8") @ 146 to 149 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
N/A		

TIME	WORK SUMMARY
0620	Travel to 200 East
0700	Arrive at 200 East, pre-job
0715	Pre-job concludes, Are in pick up respiratory gear
0811	Dress into whites don SCBA's
0832	Enter farm, install sampler and inner rod at C-9394 drive sample from 146' to 148' b.g.s., pull sampler and inner rod, pull two 2' sections of outer pipe, NGOs take sample for processing
0940	Survey out, survey out equipment
1004	Lunch
1210	Sample results are A liner B3M5D5 = 100% B liner B3M5D6 = 100% C liner B3M5D7 = 100%, shoe B3M5D8 = 100% Dress into whites Don SCBAs
1236	Enter farm, install tip and inner rod, drive 2 5/8" sample string from 148' to 149' BGS
1312	Exit farm, survey out equipment, return gear to mask station
1402	Travel to office
1630	End of shift
	K.O. 03-06-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, J. Boilerman, P. Lynsy, Z. Nelson, D. Curtis, J. Ortman

WEATHER/DOWNTIME: Snow flurries 31°

DISCARDED ITEMS: 3 sample liners, 6 sample caps,

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Ol

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 15'	LOCATION: A Tank Farm	DATE: 03-07-19	Report #: 150
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JYA-065
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN-18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-4394 Tubing (2 5/8) @ 149 to 164 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 N/A	

TIME	WORK SUMMARY
0610	Travel to 200 East 2704 bldg.
0655	Arrive at 200 East, pre-job
0724	Pre job concludes, ace in, pick up respiratory protection
0805	Dress into whites, don SCBA's
0830	Enter farm fuel and inspect rig, drive 2 5/8" sample string from 149' to 164' b.g.s (164' = sample point) prep site for sampling on Monday
0943	Exit farm, survey out equipment, return gear to mask station
1010	Travel to office
1630	End of shift

K.O. 03-07-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: J. Bonderman, R. Steffler, M. Weakley, C. Catron, P. Lynsy, Z. Nelson, J. Ortman, D. Curtis

WEATHER/DOWNTIME: 31° sunny

DISCARDED ITEMS: 1 lynch pin, 5 gal diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 13'	**LOCATION:** A Tank Farm	**DATE:** 03-11-19	**Report #:** 151
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# / **INTERVAL:** 164-166' / **%** See below	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8") @ 164 to 177 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
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0641	Arrive at 200 East, pre-job
0713	Pre job concludes, Ace in, pick up respiratory equipment
0813	Dress into whites, don SCBA's
0830	Enter farm, using 2 teams to 'tag' while tripping inner rods, install sampler to 164' at 15° angle off vertical at C-9394, drive sample from 164' to 166' b.g.s. pull sampler, install inner rod and tip, drive 2 5/8" sample string from 166' to 177', (next sample point.)
1103	Exit farm, lunch.
	Sample results are shoe B3M5F5 = 60%, A liner B3M5F2 = 100%, B liner B3M5F3 = 100%, C liner B3M5F4 = 100%
1234	Dress into whites, don SCBA's
1253	Enter farm prepped for sampling on Tuesday..
1343	Exit farm, surveys out equipment, return gear to mask station
1403	Return to shop
1630	End of shift
	K.O. 03-11-19

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weakley, J. Bonderman, R. Steffler, C. Catron, Z. Nelson, D. Curtis	33° cloudy	2 lynch pins, 3 sample liners, 6 sample caps

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.J. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 3-12-19	Report #: 152
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9394 Tubing (2 5/8") @ 17' to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work conducted at Hanford site due to site closure for adverse weather conditions
1630	End of shift

K.O. 3-12-19

OPERATOR/LICENSE: Olson # 1217 PERSONNEL:	WEATHER/DOWNTIME: 33° Snow	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 17'	**LOCATION:** A Tank Farm	**DATE:** 3-13-19	**Report #:** 153
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-HA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# / **INTERVAL:** 177-179 / **%** scff Below	18245144 / DAN18 0125	HHU XL #3	**HHU CAT #4**

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2⅝) @177 to 194' ft bgs; S.U. 4.3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9391	259-199'	Gamma

TIME	WORK SUMMARY
0611	Travel to 200 East
0642	Arrive at 200 East, pre-job
0718	Pre job concludes, ace in, pick up respiratory protection,
0743	Dress into whites, don SCBA's
0803	Enter farm, utilizing 2 drill crews to retreive sample.
0915	set up equipment for gamma logging at C-9391
	Drive sample from 177' to 179' after installation of
	sampler and inner rod at C9394, pulled sample and
	NCO's proccessed sample, Install 'dummy' tip and inner rod
	drive 2⅝" sample string from 177' to 186'
0959	Begin gamma logging
1015	Exit farm, survey out equipment
1035	lunch
	SAMPLE RESULTS = Shoe B3M5H7 = 60%, A liner B3M5F9 =
	100%, B liner B3M5H0 = 60%, C liner B3M5H1 = 100%
1236	Dress into whites don SCBA's
1251	Enter farm drive 2⅝" sample string from 186' to 194' b.s.s.
1345	Gamma logging completed at C-9391 from 259' to 199'
1406	Exit farm, survey out equipment, return gear to mask station
1427	Return to office
1630	End of shift
	K.O. 3-13-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, R. Steffler, J. Bonderman, C. Caton, Z. Nelson, D. Curtis	**WEATHER/DOWNTIME:** 44° sunny	**DISCARDED ITEMS:** 1 inner rod x 4' 3 sample liners 6 sample caps 2 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 2'	LOCATION: A Tank Farm	DATE: 3-14-19	Report #: 154
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C9344 Tubing (2 7/8") @ 194 to 196' ft bgs; S.U. 2.3		Boring # C-9341 Interval: 201 - 123' Type Gamma
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0612	Travel to 200 East
0646	Arrive at 200 East, pre-job
0711	Pre-job concluded Ace in, pick up respiratory protection
0740	Dress into whites, don SCBA's
0813	Enter farm, fuel rig, prep for gamma logging, drive 2 7/8" sample string from 194' to 196' b.g.s. (sample depth) Prep for sampling on Monday.
0850	Begin gamma logging, drill crew exits farm.
1335	Enter farm, gamma logging completed from 201' to 123' b.g.s.
1406	Exit farm, surveyed out equipment, returned gear to mask station
1426	Return to shop
1630	End of shift
	K.O.

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, M. Weakley, J. Bordenaro, J. Ortman, D. Curtis, Z. Nelson

WEATHER/DOWNTIME: 45° sunny

DISCARDED ITEMS: 10 gals diesel, 2-'O' rings, 1-lynch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly O

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 12'	LOCATION: A Tank Farm	DATE: 3-18-19	Report #: 155
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
1	196-198'	see below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8) @ 196' to 208' ft bgs; S.U. 2,1'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0646	Arrive at 200 East, pre-job
0708	Pre-job concludes, Ace in, pick up respiratory protection Travel to 'A' farm
0796	Dress into whites, don SCBA's
0807	Enter farm, install sampler and inner rod at C-9394 Drive sampler from 196' to 198', pull sampler and inner rod, NCO's processed sample, pulled 2' section of outer casing, begin installing dummy tip and inner rod.
0951	Exit farm, survey out equipment.
1006	Lunch
	Sample results, shoe B3M5H9 = 75%, A liner B3M5H6 = 100% B liner B3M5H7 = 100%, C liner B3M5H8 = 100%
1231	Dress into whites, don SCBA's
1250	Enter farm install inner rod and dummy tip drive 2 5/8" sample string from 198' to 208', added short outer rod (3.8') at 202'-198', head became hot 197° F
1403	Exit farm, survey out equipment, return scar to mask station
1431	Return to shop
1630	End of shift

K.O. 3-18-19

OPERATOR/LICENSE: Olson # 1217

PERSONNEL: J. Bonderman M. Weakley, R. Staffler, C. Catron, Z. Nelson, P. Lynsy J. Ortman

WEATHER/DOWNTIME: 50° sunny

DISCARDED ITEMS: 10 gals diesel, 3 Lynch pin, 6 sample caps, 3 sample liners

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 10'	LOCATION: A Tank Farm	DATE: 3-19-19	Report #: 156
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH(-)HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-9399 Tubing (2 5/8) @208 to 218 ft bgs; S.U. 4.1		Boring # Interval: Type
	Borehole # \ Tubing (\ )@\ to \ ft bgs; S.U. \		C-9391 125-47' Gamma
	Borehole # \ Tubing (\ )@\ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0613	Travel to 200 East
0646	Pre-job meeting at 200 East
0706	Pre-job concludes, Are in pick up respiratory protection
0804	Dress into whites, don SCBA's
0816	Enter farm, prep for gamma logging, HPTs, IH, and NCO's perform courtesy checks on hags and tool boxes
0832	Drill crew enters farm, drive 2 5/8" sample strings from 208' to 218'
0858	Gamma logging begins
0926	Head become hot, 187°F, Exit farm
0935	Farms under AOP-015 (vapors), shut down for entry.
1314	Dress into whites, don SCBAs
1332	Entry allowed into farm to shut down logging equipment No direct push activities due to AOP-15 in afternoon
13:41	Shut down gamma logging, logging completed from 125' to 47' at C-9391
1403	Exit farm via evaporator gate due to change trailer closure, survey out equipment, return gear to mask station

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, J. Bonderman, R. Steffler, C. Caton, J. Ortman, Z. Nelson	WEATHER/DOWNTIME: 49° sunny	DISCARDED ITEMS: 3 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ol	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 54'	LOCATION: A Tank Farm	DATE: 3-20-~~19~~ 20	Report #: 157
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9394 Tubing (2 5/8") @ 218' to 272' ft bgs; S.U. 2.1'	Boring # C-9391 Interval: 49.5-0 Type Gamma	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0612	Travel to 200 East
0644	Arrive at 200 East, pre-Job meeting
0713	Pre-job meeting concludes, Ace in, pick up respiratory gear
0803	Dress into whites, don SCBAs
0829	Enter farm, drive 2 5/8" sample string from 218' to 238' b.g.s.
0911	Exit farm, bottle change
0938	Enter farm, drive 2 5/8" tubing from 238' to 252' b.g.s. Prepped for logging at C-9391
1012	Begin gamma logging at C-9391
1027	Exit farm, survey out equipment
1041	Lunch
1214	Dress into whites don SCBA's
1231	Enter farm, drive 2 5/8" from 252' to 272' at 15° angle off vertical at C-9394, Head became hot (187°)
1331	Logging completed at C-9391 (49.5'-0') gamma
1350	Exit farm, survey out equipment, return gear to mask station
1403	Return to shop
1630	End of shift
	K.O. 3-20-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Catron, J. Bonderman, R. Steffler, Z. Nelson, P. Lynsy, J. Ortman	WEATHER/DOWNTIME: 62° sunny	DISCARDED ITEMS: 12 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 16'	LOCATION: A Tank Farm	DATE: 3-21-19	Report #: 158
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18243144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9344 Tubing (2 5/8) @ 272 to 288 ft bgs; S.U. 2.1' Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U.	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0613	Travel to 200 East
0645	Arrive at 200 East, pre-job meeting
0712	Pre-job concludes, acc in, pick up respiratory protection
0806	Dress into whites, don SCBAs
0831	Enter 'A' farm, drive 2 5/8" sample string from 272' to 288' b.g.s. (sample depth), prep for sampling on Monday, secure site
1031	Exit farm, survey out equipment, return gear to mask station
1103	Return to shop
1630	End of shift

K.O. 3-21-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, M. Weakley, Z. Nelson, J. Orfman, C. Cotron	WEATHER/DOWNTIME: 65° sunny	DISCARDED ITEMS: 2 '0' rings 6 Lynch Pins 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 5'	LOCATION: A Tank Farm	DATE: 3-25-19	Report #: 159
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 180125	HHU XL #3	HHU CAT #4
1 288-290' see below	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9344 Tubing (2 5/8) @ 288 to 293 ft bgs; S.U. 2.1'	Boring # Interval: Type	
	Borehole # \ Tubing (\) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0611	Travel to 200 East
0643	Arrive at 200 East, pre-job meeting
0708	Pre-job concludes, Acc in, pick up respiratory protection
0802	Dress into whites, don SCBAs
0819	Enter farm, install sampler and inner rod, drive sampler from 288' to 290' bgs, pull sampler and inner rod using two drill teams to keep steady work flow, install inner rod and tip and prepare to drive to next sample depth
1038	Exit farm, survey out equipment
1055	Lunch
	Sample results were, Shoe B3M5J6 = 30%, A liner B3M5J3 = 100%, B liner B3M5J4 = 100%, C liner B3M5J5 = 100%
1220	Dress into whites, don SCBAs
1250	Enter farm, drive 2 5/8" sample string from 290' to 293' (next sample point, prepped for sampling
1342	Exit farm, survey out equipment, return gear to mask station
1408	Return to shop
	K.O. 3-25-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: J. Bunderman, M. Weakley, R. Steffler, C. Catron, D. Curtis, Z. Nelson,

WEATHER/DOWNTIME: 65° cloudy

DISCARDED ITEMS: 3 sample liners, 6 sample caps, 2 4' inner rods

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 2'	LOCATION: A Tank Farm	DATE: 3-26-19	Report #: 160
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18345144 DAN 18 0125		
1 293-295' see below	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-9394 Tubing (25g) @ 293 to 295' ft bgs; S.U. 2.1'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0612	Travel to 200 East
0643	Arrive at 200 East, pre-job meeting
0703	Pre-job concludes, ace in, pick up respiratory protection
0750	Dress into whites, don SCBA's
0812	Enter farm, using two drill teams to ensure steady work-flow, install sampler and inner rod, drive last sample from 293' to 295' at C-9394, pull inner string in 4' sections, send sample out to be processed, Begin pulling 'Nail' on base plate, pulled two nails
1035	Exit farm, survey out equipment
1051	Lunch
	Sample results are shoc B3M5KK3 = 50% A Liner B3M5K0 = 100%, B3M5K1 = 100% (B-liner), and C liner B3M5K2 = 100%
1218	Dress into whites, don SCBA's
1236	Enter farm, Pulled remaining 2 'nails', moved plate to C-9396
1320	Exited farm for possible case of ringworm
1346	Return to Shop
1630	End of shift
	K.O. 3-27-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, M. Weakley, R. Steffler, C. Catron, D. Curtis, E. Nelson	WEATHER/DOWNTIME: 55° sunny	DISCARDED ITEMS: 5 gals diesel, 3 sample liners, 6 sample caps

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 26'	LOCATION: A Tank Farm	DATE: 3-27-19	Report #: 161
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
1	Surface	
2	10'-12'	
3	17'-19'	

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9396 Tubing (2 5/8) @ 0' to 26' ft bgs; S.U. 4.3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0645	Arrive at 200 East, pre-job meeting
0706	Pre job concludes
0803	Operators take surface sample at C-9396, moved rack of 2 5/8" dual sampling string into farm
0831	Dress into whites, don SCBA's
0850	Enter farm, finish installing angle plate and set up of Rig at 45° angle, drove to 10', pulled inner rod, installed and drove sampler from 10' to 12', pulled sample, installed inner rod and drove to second sample depth of 17' b.g.s
1115	Exit farm, survey out equipment
1130	Lunch
1308	Dress into whites, don SCBAs
1331	Enter farm, pull inner rod install sampler and drive sample from 17'-19', pull sample, install inner rod, drive 2 5/8 sample string from 19' to 26' b.g.s
1420	Exit Farm, survey out equipment, return gear
1450	Return to office
1630	End of shift
	Sample Results - Surface samples B3M5M8, B3M5M8, B3M5N1, B3M5N1 sample 2-(10'-12') shoe B3M5P1=90%, A liner B3M5N8=100%, B liner B3M5N9=100%, C liner B3M5P0=50%, SAMPLE #3 17-19 = Shoe B3M5P5=50%, A liner B3M5P5=100%, B liner B3M5P6=100%, C-liner B3M5P7=80% recovery

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, R. Steffler, C. Catron, P. Lynn, E. Nelson, J. Ostman, D. Curtis

WEATHER/DOWNTIME: 50% cloudy

DISCARDED ITEMS: 5 gals diesel, 6 sample liners, 12 sample caps, 3 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 20'	LOCATION: A Tank Farm	DATE: 3-28-19	Report #: 162
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	182445144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING

Borehole # C-9396 Tubing (2 5/8") @ 26' to 46' ft bgs; S.U. 4.3'

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

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

Boring #	Interval:	Type
C-9396	46-0'	Gyro

TIME	WORK SUMMARY
0613	Travel to A 200 East
0645	Arrive at 200 East, pre-job meeting
0706	Pre-job concludes, Ace in, pick up respiratory equipment
0803	Dress into whites, don SCBA's
0821	Enter farm, drive 2 5/8" sample string from 26' to 46' bgs at 45° angle, pulled inner rod.
0945	Setting up for Gyro run at C-9396
10:30	Begin gyro warm up
1045	Exit Farm survey out equipment
1100	Lunch
1215	Dress into whites, don SCBA's
1232	Enter farm, perform 4 gyro runs on C-9396, 46'-0' at 45° angle
1343	Exit farm, survey out equipment
1405	Return to office, give out logging data to be interpreted.
1630	End of shift

K.O. 3-28-19

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: J. Bonderman, M. Weekly, C. Cetron, D. Curtis, P. Lynsy	47° cloudy	10 gals. diesel, 2 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stettler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 20'	LOCATION: A Tank Farm	DATE: 4-1-19	Report #: 163
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-05
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-9396 Tubing (2 5/8) @ 0/66 to 66' ft bgs; S.U. 4'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		C-9396 66-0' Gyro
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0611	Travel to 200 East
0640	Arrive at 200 East, Pre job meeting
0721	Pre-job concludes, Ace in, pick up respiratory protection
0803	Dress into whites, don SCBA's
0829	Enter farm, install inner rod and tip, drive 2 5/8" sample string from 46' to 66' bgs, stop there and pull inner rod for gyro runs
1031	Exit farm, survey out equipment, gyro warm-up
1150	Lunch
1203	Dress into whites, don SCBAs
1217	Enter farm perform four gyro runs at C-9396
1342	Exit farm, survey out equipment, return gear to mask station
1418	Return to shop and take Gyro data in to be examined before proceeding
1630	End of shift
	K.O. 4-1-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Cafton, D. Curtis, J. Ortman, Z. Nelson, P. Lynsy	WEATHER/DOWNTIME: 64° partly cloudy	DISCARDED ITEMS: 5 gals diesel 5 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Ols	REVIEWED BY: RZ Stettler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Ols	SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 20'	LOCATION: A Tank Farm	DATE: 4-2-19	Report #: 164
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
1	78-80'	see below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9396 Tubing (2 5/8) @ 66' to 86 ft bgs; S.U. 4'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9391	275-0'	Moisture

TIME	WORK SUMMARY
0611	Travel to 200 East via 3 rivers scientific
0648	Arrive at 200 East, pre-job
0714	Pre-job concludes, Acc in, pick up respiratory protection
0809	Dress into whites, don SCBAs
0834	Enter farm, set up for moisture logging at C-9391, install inner rod and tip at C-9396 (gyro data was good to continue), Drive 2 5/8" sample string from 66' to 78', next sample point, pull inner rod, Moisture logging in progress.
1045	Survey out equipment
1100	Lunch
1213	Dress into whites, don SCBAs
1236	Enter farm, drive sampler from 78' to 80' Bgs, pulled and processed sample, installed tip and inner rod drove 2 5/8" sample string from 80' to 86', complete moisture logging at C-9391, 275'-0'
1406	Exit farm, survey out equipment, return gear to mask station
1430	Return to shop
1630	End of shift
	SAMPLE RESULTS = Shoe B3M5R5 = 75%, A liner B3M5R2 = 100%, B liner B3M5R3 = 100%, C liner B3M5R4 = 100%
	K.O. 4-2-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, R. Steffler, C. Catron, J. Ortman, P. Lynsy	WEATHER/DOWNTIME: 72° Partly cloudy	DISCARDED ITEMS: 5 lynch pins 3 sample liners 6 sample caps

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 13	LOCATION: A Tank Farm	DATE: 4-3-19	Report #: 165
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: E7-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	(HHU XL #3)	HHU CAT #4
1 97'-99' see Below	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9396 Tubing (2 5/8) @ 86 to 99 ft bgs; S.U. 4'	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	C-9391 108-0 Moisture	
	Borehole # Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0614	Travel to 200 East
0642	Arrive at 200 East, pre-job meeting
0710	Pre-job concludes, ace in, pick up respiratory protection.
0803	Dress into whites, don SCBA's
0832	Enter farm, set up for moisture logging, inspect rig, drive 2 5/8" sample string from 86' to 97' b.g.s. (sample point) pulled tip and inner rod, Moisture logging in progress, installed sampler and inner rod and set up to sample.
1036	Exit farm, survey out equipment
1052	Lunch
1219	Dress into whites, don SCBA's
1232	Enter farm, drive sample at C-9396 from 97 to 99', pulled and processed sample, installed second sampler to be driven next shift.
1330	Exited farm for AOP-008 (high winds) Survey out equipment, return gear to mask station
1418	Return to shop
1630	End of shift
	SAMPLE RESULTS = Shoe B3M5T2 = 75%, A liner B3M5R9 = 100%, B liner B3M5T0 = 100%, C liner B3M5T1 = 100%
	K.O. 4-3-19

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: M. Weakley, R. Steffler, C. Catron, D. Curtis, J. Ortmen,	62° showers windy	6 Lynch pins 3 sample liners 6 sample caps 5 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 6'	**LOCATION:** A Tank Farm	**DATE:** 4-4-19	**Report #:** 166
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-WM-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 DAN 18 0125	**HHU CASE #1** ~~HHU XL #3~~	**HHU CAT #2** **HHU CAT #4**

SAMPLE#	INTERVAL:	%
1	99-100	See below
	101	

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9396 Tubing (2 5/8) @ 99 to 105 ft bgs; S.U. 5'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9394	296-0'	Gyro

TIME	WORK SUMMARY
0612	Travel to 200 East
0645	Arrive at 200 East, pre-job
0708	Pre-job concluded. Acc in, pick up respiratory gear
0804	Dress into whites, don SCBAs
0832	Enter farm, drive sampler from 99' to 101 bgs at C9396, begin gyro survey at C9394, pulled and processed sample, installed tip and inner rod, drove 2 5/8 sample string from 101' to 105' (sample depth), begin pulling inner rod and tip, Gyro survey in progress.
1046	Survey out of farm
1100	Lunch
1218	Dress into whites, don SCBAs
1237	Enter farm, complete pulling of inner rod and tip, install sampler and land sampler and inner rod at 105' in preperation of sampling on upcoming Sunday. Complete 3 of 3 gyro runs at C-9394
1342	Exit farm, survey out equipment, return gear to mask station.
1430	Return to shop
1630	End of shift
	SAMPLE RESULTS - Shoe B3M5T9 = 60%, A liner B3M5T6 = 100%, B liner B3M5T7 = 100% C liner B3M5T8 = 100%

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, C. Catron, R. Steffler, P. Curtis, J. Ortman, Z. Nelson	**WEATHER/DOWNTIME:** 65° cloudy	**DISCARDED ITEMS:** 3 sample liners, 6 sample caps, 3 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Ol

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 57'	**LOCATION:** A Tank Farm	**DATE:** 4-7-19	**Report #:** 167
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 DAN 180125	**HHU CASE #1** HHU XL #3	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**
1 105 - 107' see Below

BOREHOLE SUMMARY END OF SHIFT
Borehole # C-4396 Tubing (2 5/8") @ 105 to 162' ft bgs; S.U. 4'
Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ )@ \ to \ ft bgs; S.U. \

GEOPHYSICAL LOGGING
Boring # Interval: Type
N/A

TIME	WORK SUMMARY
0611	Travel to 200 East
0643	Arrive at 200 East, pre-job
0702	Pre-job concludes, Acc in, pick up respiratory protection
0809	Dress into whites, Don SCBA's
0834	Enter farm, drive Sampler from 105' to 107' b.g.s., pulled and processed sample, install tip and inner rod, drive 2 5/8" sample string from 107' to 134' at 45° angle
1044	Exit Farm, survey out equipment
1110	Lunch
1233	Dress into whites, Don SCBAs
1250	Enter farm, drive 2 5/8" sample string from 134' to 162' b.g.s. (next sample point)
1405	Exit farm, survey out equipment, return gear to mask station
1430	Return to shop
1630	End of shift
	K.O. 4-7-19
	SAMPLE RESULTS · Shoe B3M5V6 = 60% A liner B3M5V3 = 100%, B liner B3M5V4 = 100%, C liner B3M5V5 = 100%

OPERATOR/LICENSE: Olson #1217
PERSONNEL: R. Steffler, C. Cotron, B. Garza, P. Lyasy, J. Ortman

WEATHER/DOWNTIME: 65° Showers

DISCARDED ITEMS:
3 sample liners
6 sample caps
6 lynch pins
1 nylctral washer

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 0	LOCATION: A Tank Farm	DATE: 4-8-19	Report #: 168
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-HA005
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO. 18275144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE# INTERVAL: % Field + Equip. blank N/A

BOREHOLE SUMMARY END OF SHIFT
Borehole # C4396 Tubing (2 5/8) @ 162' to \ ft bgs; S.U. 4'
Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \
Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \

GEOPHYSICAL LOGGING
Boring # Interval: Type
N/A

TIME	WORK SUMMARY
0612	Travel to 200 East
0641	Arrive at 200 East pre-job
0702	Pre job ends, Acc in, pick up respiratory protection
0800	Delay for rainy conditions
0930	Rain abates, dress into whites don SCBAs
0945	Enter farm, pull tip and inner rod
1034	Exit farm, survey out equipment
1050	Lunch
1232	Dress into whites, don SCBAs
1248	Enter farm, install sampler to depth (162')
1341	Exit farm for rainy conditions and planning on collecting sample in A.M. survey out equipment
1406	Return gear to mask station, Travel to shop
1630	End of shift
	Note: Equipment blanks B3M5N6 and B3M5N7 taken Field blanks, B3M5N4 an B3M5N5 taken by NCOs
	K.O. 4-8-19

OPERATOR/LICENSE: Olson # 1217
PERSONNEL: M. Weakley, P. Lynsy Z. Nelson, C. Catron, D. Ortman B. Garza

WEATHER/DOWNTIME: Rain showers 53°

DISCARDED ITEMS: 2 'O' rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 14'	LOCATION: A Tank Farm	DATE: 4-9-19	Report #: 169
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. 1 / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE# 1 INTERVAL: 162-164 % see below

BOREHOLE SUMMARY END OF SHIFT
Borehole # C-9396 Tubing (2 5/8") @ 162 to 176 ft bgs; S.U. 4'
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \
Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \

GEOPHYSICAL LOGGING
Boring # Interval: Type
N/A

TIME	WORK SUMMARY
0614	Travel to 200 East
0648	Arrive at 200 East, pre-job meeting
0708	Pre-job concludes, ace in, pick up respiratory protection
0753	Dress into whites, don SCBAs
0817	Enter 'A' farm, drive sampler from 162' to 164' at C-9396, pulled sample and operators processed it, installed tip and inner rod, drove 2 5/8" sample string from 164 to 166'
1040	Exit farm, survey out equipment
1100	Lunch
1236	Dress into whites, don SCBA's
1251	Enter farm, drive 2 5/8" sample string from 166' to 176' b.g.s. (next sample point)
1345	Exit farm, survey out equipment
1355	Enter AOP-008 for high winds
1405	Return gear to mask station
1630	End of shift
	K.O. 4-9-19
	SAMPLE RESULTS - Shoe B3M5W3 = 60%, A-liner B3M5W0 = 100%, B liner B3M5W1 = 100%, C-liner B3M5W2 = 100%

OPERATOR/LICENSE: Olson #1217
PERSONNEL: M. Weakley, C. Cetron, P. Curtis, J. Ortman, Z. Nelson, P. Lynsy

WEATHER/DOWNTIME: 50° windy

DISCARDED ITEMS: 3 sample liners, 6 sample caps, 9 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stoffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 4-10-19	Report #: 170
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9396 Tubing (2⅝) @ 176 to \ ft bgs; S.U. 4'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0615	Travel to 200 East
0644	Arrive at 200 East, pre job meeting
0706	Pre-job concludes, Acc in, pick up respiratory protection
0806	Dress into whites, don SCBAs
0826	Enter farm, pull tip and inner rod at C-9396, Begin installing sampler to depth of 176'
0930	After making bottle change, entered AOP-008, secured site.
0945	Exit farm, survey out equipment, no more work conducted in farm due to high winds (AOP-008)
1008	Return to shop
1630	End of shift

K.O. 4-10-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, C. Catron, J. Ortman, P. Lynsy, Z. Nelson

WEATHER/DOWNTIME: 52° windy

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE:

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 2'	LOCATION: A Tank Farm	DATE: 4-11-19	Report #: 171
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
1	176-178	see below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9396 Tubing (2⅞) @ 176 to 178 ft bgs; S.U. 4'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9396	177-0	GAMMA

TIME	WORK SUMMARY
0610	Travel to 200 East
0642	Arrive at 200 East, pre-job
0702	Pre-job concludes, Accin' pick up respiratory protection
0732	Dress into whites, don SCBA's
0751	Enter farm, finish installing sampler and inner rod to 176', Drive sample from 176' to 178', pull sampler and inner rod, operators process sample.
0910	Bottle change
0931	Enter farm, clean inner string, set up and complete 1 syro run at C-9396
1050	Exit farm, survey out equipment
1115	Lunch
1233	Dress into whites, don SCBAs
1252	Enter farm, perform additional 4 runs with syro tool, secure site
1353	Exit farm, survey out equipment, return gear to mask station
1630	Return to shop
	K.O. 4-11-19
	SAMPLE RESULTS = Shoe B3M5X0 = 60%
	A liner B3M5W7 = 100%, B liner B3M5W8 = 100%,
	C liner B3M5W9 = 100%

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, C. Catron, P. Lynsy, Z. Nelson, J. Ortman

WEATHER/DOWNTIME: 54° cloudy

DISCARDED ITEMS: 3 sample liners, 6 sample caps, 2 'O' rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 178'	**LOCATION:** A Tank Farm	**DATE:** 4-14-19	**Report #:** 172
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN-18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9396 **Tubing** (2⅝) @ 178 to 0 ft bgs; **S.U.** 0		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\) @ \ to \ ft bgs; **S.U.** \		NA
	Borehole # \ **Tubing** (\) @ \ to \ ft bgs; **S.U.** \		

TIME	WORK SUMMARY
0600	Travel to 2704HV
0630	Pre job. Bentonite to be transported and staged inside farm by NCOs.
0645	Pre job concludes. Ace in and pick up respiratory equipment. Drop off PVC pipe and supplies at change trailer.
0800	Dress into whites
0815	Enter A farm. Proceed to begin decommissioning C9396.
0915	Bottle change. Have pulled 25' of pipe and set the PVC and filled it to the surface with bentonite. Re-enter farm.
1030	Exit farm for lunch. 100' decommissioned at this point.
1220	Re-enter A farm and continue decommissioning C9396
1315	Bottle change.
1345	Exit farm. Decommissioning complete.
1405	Travel to 2704HV.
1630	End of shift.
	RZS
	4-14-19

OPERATOR/LICENSE: #1217 **PERSONNEL:** RZ Stettler Aquilla Hooper	**WEATHER/DOWNTIME:** Overcast, High 40's, Low 50s;	**DISCARDED ITEMS:** 170'-1" PVC pipe 45 quarts bentonite;

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Stettler	**REVIEWED BY:** Kelly Olson / Kelly Olson
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Stettler	**SIGNATURE:** Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 75' pulled	LOCATION: A Tank Farm	DATE: 4-15-19	Report #: 173
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ES-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	1824544 DAN 18-0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8) @ 215 to 220 ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0614	Travel to 200 East
0642	Arrive at 200 East, pre-job
0704	Pre-job concludes, Ace in, pick up respiratory protection
0750	Dress into whites, don SCBA's
0807	Enter Farm, pull retaining 'nails' on C-9396 from plate move rig and set up on C-9394 at 15° off of vertical, pulled 2 5/8 casing from 295' to 254', hole bridged at this point.
1035	Exit Farm, survey out equipment
1100	Lunch
1219	Dress into whites don SCBA's
1235	Enter farm back pull casing from 254' to 220' in effort to clear bridge, no success
1340	Exit farm, survey out equipment, return gear to mask station
1406	Return to shop, gather PVC to install after clearing bridge
1630	End of shift

K.O.

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, R. Steffler, C. Catron, P. Lynsy, Z. Nelson, J. Ortman

WEATHER/DOWNTIME: 60° partly cloudy

DISCARDED ITEMS: 5 gals bentonite, 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 220' Pulled 52' Driven	**LOCATION:** A Tank Farm	**DATE:** 4-16-19	**Report #:** 174
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AK-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144 DAN 13 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # C-9394 Tubing (2 5/8) @ 220 to 0 ft bgs; S.U. 0	Boring # Interval: Type	
	Borehole # C-9394 Tubing (2 5/8) @ 0 to 52 ft bgs; S.U. 2'	N/A	
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Arrive at 200 East, pre-job meeting
0708	Pre-job concludes, Acc in, pick up respiratory protection
0806	Press into whites, don respiratory gear
0825	Enter farm, back pull casing (from 220' to 0'
	at C-9394, cleared obstruction (damp bentonite & soil)
	and set up to re-drive.
1046	Survey out equipment
1103	Lunch
1236	Dress into whites, don SCBAs
1300	Enter farm, re-drive 2 5/8" drill string from
	0' to 52' following existing bore-hole down.
1353	Exit farm, survey out equipment, return gear
	to mask station
1422	Return to shop
1630	End of shift
	K.O. 4-16-19

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: J. Bonderman, M. Weakley, R. Steffler, C. Catron, J. Ortman, Z. Nelson, P. Lynry	65° cloudy	2-O Rings 1-36" Heal jaw

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 56'	LOCATION: A Tank Farm	DATE: 4-17-19	Report #: 175
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN-18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 5/8) @ 52' to 108 ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0611	Travel to 200 East
0642	Arrive at 200 East, pre-job meeting
0703	Pre-job concludes, Acc in, pick up respiratory gear
0755	Entered AOP-012 and AOP-021 due to loss of power in 200 East and West areas
0906	Normal access to A Farm restored
0914	Dress into whites, don SCBAs
0933	Enter farm, re-push from 52' to 108' at C 9394 at 15° off vertical with 2 5/8" sample string in order to decommission bore hole.
1021	Exit farm, survey out equipment, return gear to mask station
1050	Return to shop
	No work conducted in tank farm in afternoon, due to safety meeting (mandatory) and safety Expo. at TRAC
1630	End of shift
	K.O. 4-17-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: J. Bonderman, M. Weakley, C. Cotron, J. Ortman, P. Lynsy, Z. Nelson

WEATHER/DOWNTIME: 65° breezy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stettler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 132'	**LOCATION:** A Tank Farm	**DATE:** 4-18-19	**Report #:** 176
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4394 Tubing (2 5/8) @ 1080 240 ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0608	Travel to 200 East
0642	Arrive at 200 East, pre job meeting
0703	Pre-job concludes, Ace in, pick up respiratory gear
0804	Dress into whites, don SCBA's
0823	Enter farm, re-push 2 5/8" sample string from 108' to 240' b.g.s., had previously installed bentonite at 248' so stopped at that point.
1056	Exit farm survey out equipment
1115	Lunch
1235	Take cover drill
1307	Take cover drill concludes
1320	Dress into whites don SCBAs
1336	Enter farm, back pull inner rod and set up for decommissioning.
1417	Exit farm, survey out, return gear to mask station.
1630	End of shift

OPERATOR/LICENSE: Olson #1217

PERSONNEL: J. Bonderman, M. Weakley, C. Cotron, P. Lynsy, Z. Nelson

WEATHER/DOWNTIME: 80° mostly sunny

DISCARDED ITEMS: 1 clamp die

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TLE : TEAM COGNIZANT PERSON

GNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 240' pulled	LOCATION: A Tank Farm	DATE: 4-22-19	Report #: 177
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9394 Tubing (2 7/8) @ 240 to 0' ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0641	Arrive at 200 East, pre-job meeting
0706	Pre-job concludes, ace in pick up respiratory gear.
0750	Dress into whites, don SCBA's
0810	Enter farm, Back-pull 2 5/8" casing from 240' to 216', install 1" pvc tremie pipe, back pull from 216' to 60' b.g.s at 15° angle from vertical while back-filling with bentonite crumbles
1036	Exit farm, survey out equipment
1055	Lunch
1216	Dress into whites, don SCBA's
1232	Enter farm back pull 2 5/8" casing from 60' to 0' folded up rig, lubed hammer, moved plate to C-9392 and moved equipment out of way for placing plate
1347	Exit farm, survey out equipment, return gear to mask station.
1418	Return to shop
1630	End of shift

K.O. 4-22-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, J. Bonderman, R. Steffler, C. Catron, R. Z. Nelson, J. Ortman, P. Lynsy

WEATHER/DOWNTIME: 78° sunny

DISCARDED ITEMS: 4 gals diesel, 14 sacks bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Ol

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 16'	LOCATION: A Tank Farm	DATE: 4-23-19	Report #: 178
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SHJHA-003
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
1	0-1'	see below
2	8-10	
3	14-16	

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9392 Tubing (2 5/8") @ 0 to 16 ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0643	Arrive at 200 East, pre-job meeting
0703	Pre job concludes, Ace in, pick up respiratory gear
0802	NCOs collect surface sample at C-9392, NCOs moved old drill string from site, moved new 2 5/8" sample string into farm, re-located, leveled and set up plate for C-9392, drove retaining 'nails', set up rig at 30° angle from vertical and drove 2 5/8" tubing from 0' to 8' (sample point), pulled inner rod and prep for sampling
1100	Survey out of farm
1115	Lunch
1237	Dress into whites, don SCBA's
1256	Enter farm, install and drive sampler from 8 to 10', pull and process sample drive from 10' to 14', pull inner rod, install sampler, drive sample from 14-16', pull 2* 2' sections, installed inner rod.
1408	Exit farm, survey out equipment, return gear to mask station
1432	Return to shop
1630	End of shift
	SAMPLE INFORMATION - 8-10' sample - Shoe B3M4D1 = 100%, A liner B3K586 = 100%, B liner B3K587 = 100%, C liner B3L3V8 = 10%
	14-16' = Shoe B3M4W2 = 100%, A liner - B3M4V4 = 100%, B liner B3M4W0 = 100%
	C-liner B3M4W1 = 25% Surface sample = B3M4R7

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, M. Weakley, R. Steffler, C. Catron, Z. Nelson, P. Lynsy, J. Ortman	WEATHER/DOWNTIME: 78° breezy	DISCARDED ITEMS: 2 O rings, 1 lynch pin, 6-sample liners, 12 sample caps

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 38'	LOCATION: A Tank Farm	DATE: 4-24-19	Report #: 179
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: % N/A	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9392 Tubing (2⅝) @ 16' to 54' ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9392	54-0	Gyro

TIME	WORK SUMMARY
0610	Travel to 200 East
0641	Arrive at 200 East, pre-job meeting
0714	Pre job concludes, Ace in, pick up respiratory protection
0803	Dress into whites, don SCBA's
0826	Enter farm, drive 2⅝ sample string from 16' to 54'
	D.S.S. (Gyro and sample depth) pulled inner rods, set
	up and begin warm up for Gyro tool
1021	Exit farm, survey out
1040	Lunch
1217	Dress into whites, don SCBA
1232	Enter farm, perform 4 gyro runs at C-9392
1341	Exit farm survey out, return gear to mask station
1405	Return to shop and send off gyro data to be analysed.
1630	End of shift
	K.O. 4-24-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, M. Weckley, R. Steffler, C. Catron, D. Curtis, Z. Nelson, P. Lynsy, J. Ortman	WEATHER/DOWNTIME: 76' Breezy	DISCARDED ITEMS: 1 Lynch pin 5 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 30'	LOCATION: A Tank Farm	DATE: 4-25-19	Report #: 180
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SK-JHA-005
SAMPLING SUMMERY	U-DIG NO. 18245144 / EXCAVATION PERMIT NO. DAN-18-0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE#	INTERVAL:	%
1	54-56	see
2	60-62	below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C4392 Tubing (2 5/8) @ 54 to 84 ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0641	Travel to 200 East
0643	Arrive at 200 East, pre job meeting
0712	Pre job concludes, Acc in, pick up respiratory gear
0812	Dress into whites, don SCBA's
0824	Enter farm, install sampler and inner rod to 54', drive first sample from 54 to 56', pulled sampler and NCO's processed it, install tip and inner rod and drive from 56' to 60' (sample depth) at 30° off vertical, pull tip and inner rod, install sampler, drive 2nd sample from 60' to 62', pull and process sample, install inner rod and tip, drive from 62' to 64'
1040	Exit farm survey out equipment
1055	Lunch
1217	Dress into whites, don SCBAs
1236	Enter farm, drive 2 5/8" sample string from 64' to 84' BGS
1340	Head became hot, exit farm, survey out equipment, return gear to mask station
1404	Return to shop
1630	End of shift
	SAMPLE INFORMATION - SAMPLE #1: Shoe B3M4W9 = 100%, A liner B3M4W6 = 100%, B liner B3M4W7 = 100%, C liner B3M4W8 = 90%, SAMPLE #2 - Shoe - B3M4X6 = 75%, A-liner B3M4X3 = 100%, B liner B3M4X4 = 100%, C liner B3M4X5 = 100%

OPERATOR/LICENSE: Olson #1217

PERSONNEL: J. Banderman, M. Weakley, C. Catron, D. Curtis, N. Jordan, Z. Nelson, P. Lynsy

WEATHER/DOWNTIME: 70° partly cloudy

DISCARDED ITEMS: 6 sample liners, 12 sample caps, 8 gals diesel, 2 18" heel jaws, 2 18" hook jaws & 1 hatch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 60'	LOCATION: A Tank Farm	DATE: 4-29-19	Report #: 181
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
1	113-115'	see below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9392 Tubing (2 5/8) @ 84 to 144 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
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0641	Arrive at 200 East pre-job
0714	Pre-job concludes, Are in, pick up respiratory gear
0758	Dress into whites don SCBA's
0814	Enter farm, drive 2 5/8" sample string from 84' to 113' (sample depth), tripped out inner rod and tip and installed sampler and prepped to sample.
1003	Exit farm, survey out equipment
1015	Lunch
1158	Dress into whites, don SCBA's
1213	Enter farm, drive 2 5/8" pipe and sampler from 113' to 115', pulled and proccessed sample, installed tip and inner rod, drove from 115' to 144' b.g.s. Head became hot 188° F
1401	Exit farm survey out equipment, return gear to mask station
1428	Return to shop
1630	End of shift
	SAMPLE RESULTS = B3M4Y3 = 100%, A liner B3M4Y0 = 100%, B liner B3M4Y1 = 100%, C liner B3M4Y2 = ~~70%~~ 100%
	K.O. 4-29-19

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: J. Bonderman, M. Weakley, R. Steffler, C. Catron, P. Lynch, Z. Nelson, J. Ortman, N. Jordan	WEATHER/DOWNTIME: 62° Sunny	DISCARDED ITEMS: 3 sample liners, 6 sample caps, 1 drive head coupler, 7 Lynch pins, 1 - O-Ring

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 33'	LOCATION: A Tank Farm	DATE: 4-30-19	Report #: 182
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 180125	HHU XL #3	HHU CAT #4
1 - 158-160' see below	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9392 Tubing (2⅝) @ 144 to 177 ft bgs; S.U. 4'	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0642	Pre-job
0709	Pre job concludes, race in pick up respiratory gear
0738	Dress into whites, don SCBA's
0750	Enter farm drive 2⅝" sample string from 144' to 158', (sample depth) pulled tip and inner rod, install samplers and drive sample from 158' to 160', pull and process sample, install tip and inner rod, set up to drive.
1021	Exit farm, survey out
1038	Lunch
	SAMPLE RESULTS= Shoe B3M500 = 60%, A liner B3M4Y7 = 100%, B liner B3M4Y8 = 100%, C-liner B3M4Y9 = 100%
1203	Dress into whites, don SCBAs
1224	Enter farm drive 2⅝" sample string from 160' to 177', head became hot at that point (205°F)
1322	Exit farm, survey out equipment, return gear to mask station
1406	Return to shop
1630	End of shift
	K.O. 4-30-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: J. Bonderman, M. Weakley, R. Steffler, C. Catron, P. Lynsy, D. Curtis, J. Ortman, Z. Nelson	WEATHER/DOWNTIME: 72° sunny	DISCARDED ITEMS: 5 gals diesel 3 sample liners 6 sample caps 8 lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 47'	**LOCATION:** A Tank Farm	**DATE:** 5-1-19	**Report #:** 183
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ETSH-SHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125		
1 - 190-192' see beto	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-4392 Tubing (2⅝) @ 177 to 224 ft bgs; S.U. 2.3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0611	Travel to 200 East
0644	Arrive at 200 East - pre job
0712	Pre-job concludes, ace in, pick up respiratory gear
0731	Dress into whites, Don SCBA's
0746	Enter farm, drive 2⅝" sample string from 177' to 190' (sample depth), pull tip and inner rod, install and drive sampler from 190' to 192' bgs pull sampler and NCOs processed sample, installed tip and inner rod and drove from 192' to 200', added short outer casing at #50
1116	Exit farm, survey out equipment
1130	Lunch
	SAMPLE RESULTS = Shoe B3M507 = 60% A liner B3M504 = 100% B liner B3M505 = 106% C liner B3M506 = 100%
1310	Dress into whites, don SCBA's. Enter farm.
1314	Drive 2⅝ sample string from 200' angled pipe run to 224' angled pipe run. Heads hot.
1405	Exit farm. Survey out equipment. Return PPE to 2704HV.
1425	Return to shop
1630	End of shift.

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, R. Steffler, C. Cetron, N. Jansheyogortmann

WEATHER/DOWNTIME: 73° sunny

DISCARDED ITEMS: 3 sample liners, 6 sample cups, 2-O Rings, 5 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 30'	LOCATION: A Tank Farm	DATE: 5-2-19	Report #: 184
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 / DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE# INTERVAL: %

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9392 Tubing (2 5/8) @ 224 to 254 ft bgs; S.U. 23'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

NA

TIME	WORK SUMMARY
0610	Travel to 2704 HV.
0645	Pre job. Drive 30' and land sampler.
0710	Meeting adjourned. Pick up respiratory gear.
0820	Don PPE and enter A farm and begin driving 2 5/8 drill string from 224' angled pipe run to 254'.
0940	Made sample depth. Exit farm.
1235	Re-enter farm. Trip out inner rod and trip in sampler.
1340	Exit farm. Return PPE.
1400	Drive to shop.
1630	End of shift.

RZS
5-2-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: Steffler, Weakley, Bonderman

WEATHER/DOWNTIME: Clear / breezy ≈ 65°

DISCARDED ITEMS: (12) Lynch pins. (1) 36" hook jaw.

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Rory Z Steffler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Steffler

REVIEWED BY: Kelly Olson / Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 8'	LOCATION: A Tank Farm	DATE: 5/5/19	Report #: 185
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. 1 / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE#	INTERVAL:	%
1	254-256	see below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4392 Tubing (0.5") @ 254 to 262' ft bgs; S.U. 2

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0610	Travel to 200 East
0638	Arrive at 200 East, pre-job meeting
0701	Pre job conclude are in, pick up respiratory gear
0726	Dress into whites don SCBA's
0803	Enter farm, fuel rig, drive sampler from 154-156', pull inner rod and sampler, operators processed sample
0905	Exit farm, Break
0917	Dress into whites, prepare to enter farm
0928	Discovered Leaking regulator on SCBA Rack, travel to 2704 HBV and replace rack
0951	Enter farm, install tip and inner rod, drive 2 5/8" sample string from 256 to 258' b.s.s
01046	Exit farm, survey out
1100	Lunch
	SAMPLE RESULTS = Shoe B3M514 = 70%, A liner B3M511 = 100%, B liner B3M512 = 98%, C liner B3M513 = 100%
1217	Dress into whites, don SCBA's
1233	Enter farm drive 2 5/8 sample string from 258' to 262' (sample depth) trip out tip and inner rod, install and load sampler and set up to drive sample in A.M.
1431	Exit farm survey out equipment, return gear to mask station
1500	Return to Shop
1630	End of shift

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. Steffler, C. Cafron, D. Curtis, J. Ortman, Shelby?	WEATHER/DOWNTIME: 83° sunny	DISCARDED ITEMS: 3 sample liners, 6 sample caps, 2 o'rings, 10 gals diesel, 6 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 4'	LOCATION: A Tank Farm	DATE: 5-6-19	Report #: 186
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 Dan 180125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE#	INTERVAL:	%
1	262-264	see below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-3942 Tubing (2 5/8) @ 262 to 266 ft bgs; S.U. 2

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0639	Arrive at 200 East, pre-job meeting
0713	Pre-job concludes, Acc in, pick up respiratory gear
0741	Dress into whites, don SCBAs
0804	Enter farm, drive samples from 262' to 264' at C-9392
	Pull and process sample, install tip and inner
	rod and drive 2 5/8" tubing from 264 to 266' (next
	sample depth)
1025	Exit farm, survey out
1045	Lunch
	SAMPLE RESULTS = shoe B3M521 = 60%, A liner B3M518 =
	100%, B liner B3M519 = 100%, C liner B3M520 = 100%
1204	Dress into whites, don respiratory protection
1213	Enter farm, pull tip and inner rod, install sampler
	to depth and prepare to pull sample in A.M.
1346	Exit farm, survey out equipment, return gear to
	mask station
1409	Return to shop
1630	End of shift
	K.O 5-6-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weekley, C. Catron, J. Ortman, N. Jenshen, Z. Nelson, P. Lynsy	WEATHER/DOWNTIME: 83° sunny	DISCARDED ITEMS: 3 sample liners, 6 sample caps, 1 Lynch pin

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 2'	**LOCATION:** A Tank Farm	**DATE:** 5-7-19	**Report #:** 187
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 18245144 **EXCAVATION PERMIT NO.** DAN 18 0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE#	INTERVAL:	%
1	266-268	

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9392 Tubing (25') @ 266 to 268 ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9392	266-0'	Gyro

TIME	WORK SUMMARY
0612	Travel to 200 East
0642	Arrive at 200 East, pre job meeting
0713	Pre job concludes, ace in, pick up SCBA's
0750	Dress into whites, don respiratory gear
0812	Enter farm, fuel rig, drive sampler from 266 to 268 at C-9392 at 30° off vertical, pull inner rod in 4' joints (hole is completed to total depth) operators process sample clean up and prepare to Gyro Borings.
0940	Exit farm, survey out equipment
	SAMPLE RESULTS= Shoe B3M528 = 70% A-liner B3M525 = 100% B liner B3M526 = 100%, C liner B3M527 = 100%
1200	Dress into whites, don SCBAs
1215	Enter farm, perform 3 gyro runs at C-9392
15~~30~~ ~~3:33~~	Exit farm, survey out equipment, return gear to mask station
1550 ~~350~~	Return to shop
1630	End of shift

K.O. 5-7-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catron, J. Ortman, N. Jensen, P. Lynsy

WEATHER/DOWNTIME: 82° sunny

DISCARDED ITEMS: 3 sample liners, 6 sample caps, 10 gals diesel, 1 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 268' pulled	LOCATION: A Tank Farm	DATE: 5-8-19	Report #: 188
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 180125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C4392 Tubing (2 5/8) @ 268 to 0 ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0613	Travel to 200 EAST
0642	Arrive at 200 East, pre-job
0712	Pre-job concludes, Acc in, pick up respiratory gear
0752	Dress into whites, don SCBAs
0811	Enter 'A' farm, back pull casing from 268' to 246',
	install 1" pvc ~~sleeve~~ liner for bentonite installation,
	back pull 2 5/8" outer casing from 246' to 100' b.g.s
	while back-filling with bentonite crumbles
1120	Exit farm, survey out equipment
1140	Lunch
1303	Dress into whites don SCBA's
1317	Enter farm, Pull remaining 25 joints of 2 5/8"
	outer string (100' to 0' b.g.s.) while back filling
	with bentonite crumbles via 1" PVC Tremie pipe.
1432	Exit farm, survey out equipment, return gear to mask
	station
1456	Travel to shop
1630	End of shift
	K.O. 5-8-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, R. Steffler, C. Catron, J. Ortman, N. Jensen, K. Lynsy

WEATHER/DOWNTIME: 75° cloudy

DISCARDED ITEMS: 16 sacks bentonite.

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 0	LOCATION: A Tank Farm	DATE: 5-9-19	Report #: 189
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SHJHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: % N/A	U-DIG NO. 18245144 / EXCAVATION PERMIT NO. DAN 18 0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing (2½") @ 0' to \ ft bgs; S.U. 1

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0609	Travel to 200 East
0640	Arrive at 200 East, pre-job
0719	Pre-job concludes, Acc m, pick up respiratory gear
0804	NEO's off load rack of 2½" drive pipe and equipment
0819	Dress into whites don, SCBAs
0840	Enter farm, pull 'nails' from angle plate at C-9392,
	NEO's begin moving equipment for site to site move,
	RCTs survey rig and equipment moving from CA to RBA
	begin setting up plate at C-9387
1045	Exit farm, survey out equipment
1100	Lunch
1230	Stand-by for crane activity (crane needed to
	be moved to allow passage to next site)
1318	Crane moved out of path, survey rig from CA to RBA,
	set plate, drive 'nails', set up on C-9387 at 85° angle
	off of vertical.
1448	Survey out return gear to mask station
1305	Return to shop
1630	End of of shift
	K.O 5-9-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, M. Weakley, C. Catron, J. Ortmeny, N. Jenshen, D. Curtis

WEATHER/DOWNTIME: 85° sunny

DISCARDED ITEMS: 1 sack bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 58'	LOCATION: A Tank Farm	DATE: 5-13-19	Report #: 190
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA:
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		
N/A			

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing (2½) @ 0 to 58 ft bgs; S.U. 4

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9387	0-26	Gyro
C-9387	0-58	Gyro

TIME	WORK SUMMARY
0609	Travel to 200 East
0640	Arrive at 200 East, pre-job
0714	Pre job concludes, Ace in, pick up respiratory gear
0831	Enter farm, inspect rig, drive 2½" tubing from 0' to 26' (Gyro stop.)
0910	Set up and run Gyro survey
1024	Exit farm, stand-by for Gyro results before advancing.
1315	Gyro results come back good
1332	Enter farm, drive from 26' to 58' (gyro stop)
1412	Set up and begin Gyro runs
1531	Gyro runs completed, exit farm, take data to town to be reviewed
1630	End of shift
	K.O. 5-13-19

OPERATOR/LICENSE: Olson # 1217

PERSONNEL: M. Weakley, R. Steffler, C. Catron, J. Ortman, N. Jensen, P. Lynsy, Z. Nelson

WEATHER/DOWNTIME: 82° partly sunny

DISCARDED ITEMS: 4 Lynch pins, 2 36" Hook jaws

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 101'	LOCATION: A Tank Farm	DATE: 5-14-19	Report #: 191
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-J HA-005
SAMPLING SUMMERY	U-DIG NO. 1 / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing (2½) @ 58 to 159 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0610	Travel to 200 East
0642	Arrive at 200 East, pre job meeting
0713	Pre-job concludes, Ace in, pick up respirators gear
0802	Enter farm, service and inspect rig, fuel, drive 2½" tubing from 58' to 103' (allowing head to cool 60 minutes between 82' and 58')
1028	Exit farm, allow head to cool
1239	Enter farm, drive from 103' to 143'
1302	Exit farm allow head to cool.
1353	Enter farm drive from 143' to 159'
1426	Head became hot, exit farm, return gear to mask station, return to shop
1630	End of shift

K.O. 5-14-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Cotron, Jeff ostman, Z. Nelson, N. Jeisher

WEATHER/DOWNTIME: 72° cloudy

DISCARDED ITEMS: 28 Lynch pins, 10 gals fuel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 68'	LOCATION: A Tank Farm	DATE: 5-15-19	Report #: 192
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SM-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing (2½) @ 159 to 227 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0612	Travel to 200 East
0642	Arrive at 200 East, pre-job
0701	Pre job concludes, acc in, pick up respiratory gear
0803	Enter farm, drive 2½" tubing from 159' to 191' b.s.s. at 35° off vertical, allowing head to cool as needed
1028	Exit farm, lunch
1206	Enter farm, drill from 191' to 227' at C-9387
1411	Exit farm, return gear to mask station
1432	Return to shop

K.O. 5-15-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weekley, C. Cafroni, P. Lynsy, Z. Nelson, J. Ortman

WEATHER/DOWNTIME: 73° cloudy

DISCARDED ITEMS: 21 Lynch pins, 10 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Ol

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: ~~38'~~ 38'	LOCATION: A Tank Farm	DATE: 5-16-19	Report #: 193
START CARD NO. RE15990 32'	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SM-JHA-005
SAMPLING SUMMERY	U-DIG NO. 1 / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing (2½) @227 to 259 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0613	Travel to 200 East
0642	Arrive at 200 East, pre-job
0714	Pre-job concludes, Ace in, Pick up respiratory gear
0806	Enter farm drive 2½" exploratory string from 227' to 243' allowing head to cool as needed
1028	Exit farm, allow head to cool, Lunch
1207	Enter farm; drive from 243' to 259', allowing head to cool as needed
1412	Exit farm, return gear
1430	Return to shop.

K.O. 5-16-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catron, J. Ortman, P. Lynsy, Z. Nelson, D. Curtis

WEATHER/DOWNTIME: Cloudy, Rain showers

DISCARDED ITEMS: 6 Lynch pins

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 36'	LOCATION: A Tank Farm	DATE: 5-17-19	Report #: 194
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ETSH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	15245144 DAN 180125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing (2½) @ 259 to 295 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0613	Travel to 200 East
0640	Arrive at 200 East, Pre-job
0708	Pre-job concludes, are in, pick up respiratory gear
0743	Enter A farm, drive 2½" exploratory pipe from 259' to 287' b.g.s., allowing head to cool as needed
1028	Exit farm, Lunch
1214	Enter farm, drive 2½" drill rod from 287' to 295' at 35° angle off vertical. (295' total depth required), set up for Gyro runs.
1322	Exit farm, return gear to mask station
1350	Return to shop
1630	End of shift

K.O. 5-17-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. Steffler, C. Cetron, J. Ortman, N. Jenshen	WEATHER/DOWNTIME: 68° showers, cloudy	DISCARDED ITEMS: 18 Lynch pins, 5 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 5-19-19	Report #: 195
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: [illegible]
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING

Borehole # C-9387 Tubing (2½) @ 295 to \ ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9387	291.5-0	~~Lasar~~ Gyro
C-9387	291-241.25'	Gamma

TIME	WORK SUMMARY
0609	Travel to 200 East
0640	Arrive at 200 East. Pre job
0653	Pre job concludes, A'ce in, pick up respiratory gear
0716	Enter farm and set up and begin Gyro runs
1004	Gyro runs completed, folded up Rig and moved off of hole, set up for moisture logging.
1045	Technical difficulties with moisture equipment, switched to gamma probe, set up and begin logging
1500	Stop gamma logging, Logging completed 291.5' to 241.25', secure site, survey out
1530	Return to shop
1630	End of shift

K.O. 5-19-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, D. Curtis, Z. Nelson, S. Ortman, Joel

WEATHER/DOWNTIME: 72° cloudy Breezy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 5-20-19	**Report #:** 196
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.** 18245144 / DAN180125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 295 to — ft bgs; S.U. 3

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C9387	244 - 181	Gamma

TIME	WORK SUMMARY
0607	Travel to 2704 HV.
0648	Pre job. Continue gamma logging.
0718	Pre job complete. Check on PPE.
0805	Enter A Farm. Set up logging equipment + perform pre verification.
0831	Begin repeat + overlap.
0852	Begin gamma logging.
1240	Program malfunction. Probe came out of the borehole on its own. Once it reached the tripod shive, the probe came over the shive, breaking the carbon connector between the BGO unit and the MCU unit. The MCU and the CeBr probe fell to the bottom of C9387. The BGO unit kept being pulled by the cart until it couldn't go any further. The pressure dented the depth encoder. Pictures were taken and the logging equipment was loaded and taken to Three Rivers Scientific.
1630	End of shift.

RZS 5-20-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: RZ Steffler, J. Ortman, C Catron

WEATHER/DOWNTIME: Overcast, 60°

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Steffler

REVIEWED BY: RZ Steffler / Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 5-21-19	**Report #:** 197
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SA-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 295 to — ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

NA

TIME	WORK SUMMARY
0610	Travel to 2704 HV.
0645	Pre job. Camera survey and get duct rodder out of the zone.
0713	Meeting adjourned. Pick up PPE.
0755	On site.
0812	Gate open.
0820	Set up camera and begin video-ing C9387. No obvious breaks.
0936	Exit A Farm. No abnormalities on the pipe joints. Return PPE to 2704 HV.
0950	Travel to shop.
1030	Back at shop to fabricate fishing tool onto the duct rodder. Probe resting on bottom of C9387.

RZS 5-21-19

OPERATOR/LICENSE: Olson #1217
PERSONNEL: RZ Steffler, Z. Nelson, J. Ortman, C Catron

WEATHER/DOWNTIME: 70's, Cloudy, Breezy

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: R.Z. Steffler

REVIEWED BY: RZ Steffler | Kelly Olson
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler | Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 5-22-19	**Report #:** 198
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.** 18245144 / DAN180125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 285 to — ft bgs; S.U. 3

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

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

GEOPHYSICAL LOGGING

Boring # **Interval:** **Type**

NA

TIME	WORK SUMMARY
0610	Travel to 2704HV.
0640	Arrived at 2704HV. Pre-job. Some resources needed briefly at SX farm. Rest supporting A farm fishing out of gamma probe on the bottom of C9387.
0715	Meeting adjourned. Pick up PPE.
0745	Arrived at A Farm.
0800	Gate open. Wait for HPT survey of RBA and connected area.
0815	Enter farm to attempt to extract probe out of C9387.
0845	Exit A Farm. Probe recovered. Appears to have little damage. Return PPE to 2704HV. Travel to shop.
0945	At shop. Deliver probe to Three Rivers Scientific.
1630	End of shift.

RZS 5-22-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: Aquilla Hooper, RZ Steffler

WEATHER/DOWNTIME: Slightly overcast. Light breeze, 70's

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Steffler

REVIEWED BY: RZ Steffler / Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 5-23-19	**Report #:** 199
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.** 18245144 / DAN180125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 295 to – ft bgs; S.U. 3

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

NA

TIME	WORK SUMMARY
0600	Arrive at shop. No logging today due to the probe dropping down the borehole. Three Rivers Scientific requires time to evaluate the probes and make repairs.
0810	Did cyber security training and obtained new badge. Rounded up items needed to begin probe placement experimentation.
1630	End of shift.

RZS 5-23-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: RZ Steffler

WEATHER/DOWNTIME: Not a factor

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Steffler

REVIEWED BY: RZ Steffler / Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	LOCATION: A Tank Farm	DATE: 5-28-19	Report #: 199 (200)
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EJ-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. 1 EXCAVATION PERMIT NO. 18245144 / DAN 180125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 295 to — ft bgs; S.U. 3

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C9387	NA	

TIME	WORK SUMMARY
0610	Travel to TRS to pick up probe.
0630	At G.+M machine to pick up new cone for new cart.
0705	Travel to 2704 HV.
0739	Arrive at 2704 HV.
0813	Arrive at A Farm.
0920	Out of the farm. Computer and tool not communicating.
0941	Return equipment. Travel to TRS.
1025	Returned cart + probe to TRS.
1100	Lunch.
1200	Work on probe placement experimentation.
1630	End of shift.

RZS 5-28-19

OPERATOR/LICENSE: Olson 1217 PERSONNEL: RZ Steffler	WEATHER/DOWNTIME: Calm ≈ 80°	DISCARDED ITEMS: None

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler TITLE: TEAM COGNIZANT PERSON SIGNATURE: R.J. Steffler	REVIEWED BY: RZ Steffler / Kelly Olson TITLE: ATKINS TECHNICAL REVIEWER SIGNATURE: R.J. Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 5-29-19	**Report #:** 201
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.** 18245144 / DAN 180125	~~HHU CASE #1~~ HHU XL #3	HHU CAT #2 HHU CAT #4

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (0½) @ 25 to — ft bgs; S.U. 3

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C9387	183.5-83.42	Gamma

TIME	WORK SUMMARY
0610	Pickup cart and probes at TRS and travel to 2704 HV
0655	Pre job meeting. Went over the JHA.
0720	Pre job concluded. Pick up PPE.
0810	At A farm. Gate opens.
0820	Enter farm and set up cart for logging. Perform pre verification then do repeat / overlap.
0855	Begin logging.
1440	Enter A farm + stop logging. After checking the return error, the depth blanked out. At 80, couldn't perform the post verification check.
1500	Exit farm, returned PPE and traveled to shop.
1630	End of shift.

RZS 5-29-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: RZ Steffler

WEATHER/DOWNTIME: Warm / Breezy / ≈ 80°

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: RZ Steffler

REVIEWED BY: RZ Steffler / Kelly Olson
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: RZ Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 5-30-19	**Report #:** 202
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 / DAN180125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 295 to — ft bgs; S.U. 3.0

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C9387	86.0 – 0	Gamma

TIME	WORK SUMMARY
0605	Travel to 2704HV
0645	Pre job. Gamma logging + up coming crane removal.
0710	Meeting concluded. Pick up PPE.
0730	On location at A. Farm.
0748	Gate open. Enter farm, set up equipment and perform pre verification.
0831	Start logging from 86'.
1324	Stopped logging. Checked return error (BAD!) and performed post verification.
1342	Exit farm, return PPE, travel to shop.
1430	Return to shop.
1630	End of shift.

RZS 5-30-19

OPERATOR/LICENSE: Olson # 1217	**WEATHER/DOWNTIME:** Hot / Light Breeze	**DISCARDED ITEMS:** NA
PERSONNEL: RZ Steffler		

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: R.J. Steffler
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: R.J. Steffler

REVIEWED BY: RZ Steffler / Kelly Olson
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.J. Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 6-3-19	**Report #:** 203
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 / DAN180125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 295 to — ft bgs; S.U. 3.0

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C9387	≈ 295-50	(Moisture)

TIME	WORK SUMMARY
0610	Travel to 2704 HV.
0642	Arrived. Pre job. Ice machine not for just anybodies use!! Now its locked! Moisture logging today.
0700	Meeting adjourned. Pick up PPE!
0720	Arrived on site. (A farm)
0755	Gate open. Enter farm.
0822	Perform pre verification.
0846	Not sure if the depth encoder is off, or the moisture tool is hanging up, but unable to get the probe past 145'. Started logging at 245.01'
0856	Stopped logging. Ran the probe down and marked the cable with tape at the top of casing. Marked it at 246'.
0901	Hoist tracking went to 0.00'. Depth was at 243.01'. Depth will not reset. Restart program at 0905 at 243.01'.
1430	Performed post verification. After having nearly a 50' return error, we stretched out a tape to verify. My mark, of 246' when the tool was on bottom, was just to feet short of the 300' mark.
1453	Exited farm. Returned to shop.
1630	End of shift.
	RZS 6-3-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: RZ Steffler

WEATHER/DOWNTIME: Warm / Breezy ≈ 85°

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Steffler

REVIEWED BY: RZ Steffler / Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 3 NA	**LOCATION:** A Tank Farm	**DATE:** 6-4-19	**Report #:** 204
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EJ-SA-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.** 18245144 / DAN180125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2") @ 295 to — ft bgs; S.U. 3.0

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C9387	70-0	Moisture

TIME	WORK SUMMARY
0608	Travel to 2704 HV
0645	Pre job. Finish logging the top 70' of C9387. Then push pipe flush to ground surface. Place plate for C9388. No sampling until July 1st. Lab closed mid June for 2 weeks.
0710	Meeting adjourned. Pick up PPE.
0735	On site
0745	Gate open. Entered farm and set up hoist + computer. No source yet. HPT forgot an instrument required for use of the source.
0833	Performed pre verification. Set tool at 0.00'. Ran tool down to 70' for repeat and logging. While running the probe down, the encoder would pause even though cable was going through the encoder.
1017	Logging complete. -37.69' return error.
1020	Performed post verification. Exited farm.
1045	Lunch.
1200	Return to A farm. Relocate the XL onto C9387 and push the 3' of stick up so its flush with the ground surface.
1230	Position plate and drive support nails on C9388.
1348	Move the HHU XL and equipment to staging area near the other 3 probe holes.
1430	Returned cart and probes to Three Rivers Scientific.
1630	End of shift.
Note	No stick up on C9387 anymore.

OPERATOR/LICENSE: Olson # 1217

PERSONNEL: RZ Stettler, Kelly Olson, Mike Weakley

WEATHER/DOWNTIME: Warm / 70s / Breezy

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Stettler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Stettler

REVIEWED BY: RZ Stettler / Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stettler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 6-5-19	**Report #:** 205
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SHA-SHA 005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing ($2\frac{1}{2}$) @ 278' to 298' ft bgs; S.U. 0'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0600	No work in tank farms worked at shop preparing and testing pump and materials for upcoming work (probe installation).
1630	End of shift

K.O. 6-5-19

OPERATOR/LICENSE: Olson #1217
PERSONNEL: M. Weekley

WEATHER/DOWNTIME: 82° partly cloudy

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: NA	**LOCATION:** A Tank Farm	**DATE:** 6-6-19	**Report #:** 206
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SA-SHA-005
SAMPLING SUMMERY	**U-DIG NO.** 1 **EXCAVATION PERMIT NO.** 18245144 / DHN180125	**HHU CASE #1** **HHU XL #3**	**HHU CAT #2** **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

NA

BOREHOLE SUMMARY END OF SHIFT

Borehole # C9387 Tubing (2½) @ 298 to 298 ft bgs; S.U. 0

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C9387	295-0	Moisture

TIME	WORK SUMMARY
0608	Travel to 2704 HV.
0640	Arrive at 2704 HV.
0657	Pre job. Stop work for now due to SCBA issues. Discussed in detail the up coming probe placements. On stand by waiting for the stop work to be lifted.
0735	Meeting adjourned.
0755	Notified that stop work has been lifted. Pick up PPE.
0817	On location at A farm. Gate locked. No support personel.
0852	Bottles arrive. Enter farm and set up. Pipfed a 2' piece of pipe on borehole, creating a 2' stick up. Set depth enoder at 1.0'.
0935	After pre verification, running probe to bottom and repeat at the bottom 5', logging started.
1538	Logging completed
1544	Post verification.
1550	Exit farm. Travel to shop.
1645	End of shift.

RZS 6-6-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: RZ Steffler

WEATHER/DOWNTIME: Cloudy / Breezy / Cool ≈ 65°

DISCARDED ITEMS: NA

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: RZ Steffler

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: R.Z. Steffler

REVIEWED BY: RZ Steffler / Kelly Olson

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler / Kelly Olson

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06-10-19	**Report #:** 207
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** 4X-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 PAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # N/A **Tubing** (N/A) @ \ **to** \ **ft bgs; S.U.** \	**Boring #** **Interval:** **Type**	
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \	N/A	
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0642	Arrive at 200, pre-job
0735	Pre job concludes, operators besin gathering equipment and supplies for probe installations. Continue for probe installation preperation at shop.
1630	End of shift

K.O. 06-10-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, A. Hooper, O. Amos	**WEATHER/DOWNTIME:** 85° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06-11-19	**Report #:** 208
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**
SAMPLE# **INTERVAL:** **%**	18245144 DAN 18 0125		
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9395 Tubing (2½) @ 197 to \ ft bgs; S.U. 5'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	Loading materials and equipment at shop
0630	Travel to 200 East
0703	Arrive at 200 East, pre-job
0733	Pre-job concludes, ace in, pick up respiratory protection
0805	Operators moving fork lift, off loading materials loading equipment to move into farm for probe installation
0908	Enter farm re-locate racks and pallets with forklift, set up Rig #3 on C-9395 at 45° angle.
1005	Exit farm, locate and load inner rod at RMA 12
1034	Lunch
1215	Operators move rod from RMA
1304	Enter farm, spot inner rod at site, electricians install bonding strap to generator
1332	Exit farm, Pre job meeting for wednesday
1412	Pre job concludes, Return gear to mask station.
1420	Return to shop
1630	End of shift

K.O. 6-12-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** A. Hoopes M. Weakley P. Lynsy, N. Jensen, C. Catron J. Ortan	**WEATHER/DOWNTIME:** 93° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 06-12-19	Report #: 209
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-311A-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-4355 Tubing (2½) @ 197' to \ ft bgs; S.U. 5' Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Arrive at 200 East, pick up respiratory protection, Ace in
0732	Enter A Farm, install inner rod, found approximately .5' of fill above tip, verified integrety of outer casing
0904	Exit farm, waiting for RWP to be revised to allow pulling outer casing. Return gear to mask station
0933	Return to shop, waiting on RWP

K.O. 06-12-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: A. Hoopes, M. Weakley, Z. Nelson, P. Lynsy, C. Catron, J. Ortman	WEATHER/DOWNTIME: 96° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06-13-19	**Report #:** 210
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH(-)HA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144 DAN 180125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9355 **Tubing** (2½) @ 97 **to** \ **ft bgs; S.U.** \		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\) @ \ **to** \ **ft bgs; S.U.** \		N/A
	Borehole # \ **Tubing** (\) @ \ **to** \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0600	No work in tank farms, waiting on RWP revision to be in place
1630	End of shift

K.O. 06-13-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, A. Hoopes, C. Catron, Z. Nelson, P Lyasy	**WEATHER/DOWNTIME:** 99° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stettler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06-17-19	**Report #:** 211
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX - 063	**AHA:** ET-SIT-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-4345 Tubing (2½) @ 197' to \ ft bgs; S.U. 5'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	No work done in tank farms waiting for RWP revision to be approved.
1630	End of shift

K.O. 06-17-19

OPERATOR/LICENSE: Olson # 1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: A. Hoopes, M. Weakley	95° Hot	N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stettler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 06-18-19	Report #: 212
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 180125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C4935 Tubing (1½) @ 19 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	No work conducted in tank farms due to RWP not being revised

KO - 6-18-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, R. Steffler, O. Amos	WEATHER/DOWNTIME: 83° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.J. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 06-19-19	**Report #:** 213
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9395 Tubing (2½") @ 197 to 194 ft bgs; S.U. 4'		**Boring #** **Interval:** **Type**
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # Tubing ( ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0610	Travel to 200 East
0641	Arrive at 200 East, pre-job meeting
0766	Pre-job concludes, Acc in, pick up respiratory gear
0803	Enter A-farm, RWP revised to incorporate localized CA around table of rig, back-pulled 2½" ~~outer~~ tubing from 197' to 194' b.g.s., Knocked out expendable tip and pushed it to bottom (197') Pulled inner rod (used to knock out tip), installed multi level probe and ½" poly tubing to 197' with assistance of duct rodder, set up to pull casing.
0945	Entered AOP-008 (high winds), secured site and exited farm
1003	Return gear to mask station
1021	Return to shop, no more work conducted in tank farms due to high winds.
1630	End of shift
	K. Olson 6-19-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, O. Amos, R. Steffler, J. Ortman, Z. Nelson	**WEATHER/DOWNTIME:** Windy, clear 75°	**DISCARDED ITEMS:** 1 200' multi level probe, 200' ½" poly tubing, 1 - 2½" expendable tip

1- aluminum plug
4 rive

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 36' pulled	**LOCATION:** A Tank Farm	**DATE:** 6-20-19	**Report #:** 214
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C4395 Tubing (2½") @ 194 to 158' ft bgs; S.U. 4'		Boring # Interval: Type
	Borehole # \ Tubing (\) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0612	Travel to 200 East
0639	Arrive at 200 East, pre-job
0701	Pre-job concludes, ace in, pick up respirator, gear
0802	Enter farm, back pull 2½" tubing from 194 to 162', mixed and installed 4 gals cement/Pumice grout via tremie tubing with bottom of tremie at 196' flush water (2¼ gals) was pumped to clear pipe and tubing, pulled poly-tubing to 166', used an addition 3 gals of H_2O to clean tremie pipe and bore of 2½" tubing, pulled 2½" casing from 162' to 158', secured site
0901	Exit farm, return gear to mask station
0924	Return to shop (allowing 24 hr set up time for cement)
1630	End of shift

K.O. 6-20-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, R. Steffler, O. Amos, J. Ortman, N. Jensen, P. Lynn	**WEATHER/DOWNTIME:** 70° mostly sunny	**DISCARDED ITEMS:** 9.6 lbs cement 20.4 lbs pumice

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 158' pulled	**LOCATION:** A Tank Farm	**DATE:** 6-24-19	**Report #:** 215
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** Ax-063	**AHA:** Et-SH-SHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-4345 **Tubing** (2½") @158 to 0' **ft bgs; S.U.** 0'		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\ ) @ \ to \ **ft bgs; S.U.** \		N/A
	Borehole # \ **Tubing** (\ ) @ \ to \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0614	Travel to 200 East
0646	Arrive at 200 East, pre-job
0712	Pre job concludes, Ace in, pick up respiratory gear
0804	Enter farm, back pull 2½" casing from 158' to 66', stopping every 24" to install cement pumice mix via tremie for probe installation
1031	Exit farm, survey out
1045	Lunch
1310	Enter farm, pull remaining 66' of 2½" tubing, stopping every six joints to pump Cement - pumice mix
1331	Exit farm, all pipe removed, remainder of hole needs to be topped off in A.M., can out of Portland cement inside farm
1402	Return gear to mask station, return to shop to load pipe and supplies for sample hole
1630	End of shift
	Note - see sheets for grouting info
	06-24-19

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: M. Weekley, O. Amos, A. Hoopes, C. Catron, J. Ortman, N. Jenshen, R. Nelson	75° sunny	67.2 lbs cement 142.8 lbs Pumice

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

S/N = 0519635728-3-99

ERT Installation Data Sheet

Project: A-Farm Focus Area 1
Contract 65210.009

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Borehole#: C9395 **ERT Bottom Electrode Set Depth (ft):** ≈ 194.8'

Lift # 1				
	Date:	6-20-19	**Grout Mix**	
	Initial Tag (ft):	197	Cement (lbs):	9.6 ✓
	Bottom of Tubing (ft):	194	Pozzolon (lbs):	20.4 ✓
	Depth Start (ft):	194	Water (lbs):	2.5 gal. ✓
	Depth Finish (ft):	162	Total Vol. Mixed (gal):	4
	Total Lift (ft):	32	Total Vol. Pumped (gal):	9.3
	Time Start:	0803		
	Time Finish:	0855	Flush Water (gal):	≈ 2.3 + 3.0
	Total Time:	0:52		

Comments: ~~IIII~~ III 08:33 (30 minutes to pull 8 sticks)
~~IIII~~ I 08:41

Lift # 2				
	Date:	6-24-19	**Grout Mix**	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	~~158~~ 158'	Pozzolon (lbs):	20.4
	Depth Start:	158'	Water (lbs):	2.5 GAL
	Depth Finish:	138'	Total Vol. Mixed (gal):	3.5 GAL
	Total Lift Ft.:	20'	Total Vol. Pumped (gal):	9 GAL
	Time Start:	0814		
	Time Finish:	0851	Flush Water (gal):	1ST ≈ 1 GAL RINSE
	Total Time:	37 m		2ND ≈ 2 GAL / AFTER CEMENT MIX ADD.

Comments: ~~IIII~~

Lift # 3				
	Date:	6-24-19	**Grout Mix**	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	138	Pozzolon (lbs):	20.4
	Depth Start:	138'	Water (lbs):	2.5 GAL
	Depth Finish:	118'	Total Vol. Mixed (gal):	4 GAL
	Total Lift Ft.:	20'	Total Vol. Pumped (gal):	9.5 GAL
	Time Start:	0853		
	Time Finish:	0925	Flush Water (gal):	1ST ≈ 1 GAL RINSE
	Total Time:	31 m		2ND ≈ 2 GAL / AFTER CEMENT MIX ADD.

Comments: ~~IIII~~

ERT Installation Data Sheet

Project: A-Farm Focus Area 1
Contract 65210.009

Page 3 of 3

Borehole#: C9395 **ERT Bottom Electrode Set Depth (ft):**

Lift # 4				
	Date:	6/24/19	Grout Mix	
	Initial Tag (ft):	N/A	Cement (lbs):	9.6
	Bottom of Tubing (ft):	118	Pozzolon (lbs):	20.4
	Depth Start (ft):	118	Water (lbs):	2.5 GAl
	Depth Finish (ft):	90	Total Vol. Mixed (gal):	4 GAl
	Total Lift (ft):	28	Total Vol. Pumped (gal):	10.5 GAl
	Time Start:	0940		
	Time Finish:	1013	Flush Water (gal):	1ST ≈ 1 GAl
	Total Time:	33		2ND ≈ 2 GAll AFTER CEMENT MIX ADD.
				3RD ≈ 1 GAl ADDITIONAL FLUSH
	Comments: NONE			

Lift # 5				
	Date:	6/24/19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	90	Pozzolon (lbs):	20.4
	Depth Start:	90	Water (lbs):	2.5 GAl
	Depth Finish:	66	Total Vol. Mixed (gal):	4 GAl
	Total Lift Ft.:	24	Total Vol. Pumped (gal):	9.5 GAl
	Time Start:	1015 *		
	Time Finish:	1227	Flush Water (gal):	1ST ≈ 1 GAl
	Total Time:	3hrs 53m		2ND ≈ 2 GAl AFTER CEMENT MIX ADD.
	Comments: ~~NONE~~ ≈ 1 GALLON OF FLUSH WASTER WAS DUMPED DOWN THE HOLE FOR RINSING * LUNCH			

Lift # 6				
	Date:	6/24/19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	66	Pozzolon (lbs):	20.4
	Depth Start:	66	Water (lbs):	2.5 GAl
	Depth Finish:	42	Total Vol. Mixed (gal):	4 GAl
	Total Lift Ft.:	24	Total Vol. Pumped (gal):	9.5 ~~9.5~~ GAl
	Time Start:	1230		
	Time Finish:	1248	Flush Water (gal):	1ST ≈ 2 GAl AFTER CEMENT MIX ADD
	Total Time:	18m		2ND ≈ 1 GAl
	Comments: NONE			

ERT Installation Data Sheet

Project: A-Farm Focus Area 1
Contract 65210.009

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Borehole#: C9395

ERT Bottom Electrode Set Depth (ft):

Lift # 7				
	Date:	6/24/19	Grout Mix	
	Initial Tag (ft):	N/A	Cement (lbs):	9.6
	Bottom of Tubing (ft):	42	Pozzolon (lbs):	20.4
	Depth Start (ft):	42	Water (lbs):	2.5 GAL
	Depth Finish (ft):	18	Total Vol. Mixed (gal):	4 GAL
	Total Lift (ft):	24	Total Vol. Pumped (gal):	8.5 GAL
	Time Start:	1250		
	Time Finish:	1306	Flush Water (gal):	1ST ≈ 2 GAL AFTER CEMENT MIX ADD.
	Total Time:	16 m		
	Comments: NONE			

Lift # 8				
	Date:	6/24/19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	18	Pozzolon (lbs):	20.4
	Depth Start:	18	Water (lbs):	2.5 GAL
	Depth Finish:	0.0 G.S.	Total Vol. Mixed (gal):	4 GAL
	Total Lift Ft.:	18	Total Vol. Pumped (gal):	6.5 GAL
	Time Start:	1310		
	Time Finish:	1324	Flush Water (gal):	
	Total Time:	14		
	Comments: NONE			

Lift # 9				
	Date:	6/25/19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	18	Pozzolon (lbs):	20.4
	Depth Start:	18	Water (lbs):	2.5 gal
	Depth Finish:	0	Total Vol. Mixed (gal):	4 gal
	Total Lift Ft.:	18	Total Vol. Pumped (gal):	6.5 gal
	Time Start:	0905		
	Time Finish:	0925	Flush Water (gal):	
	Total Time:	20		
	Comments:			

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 26'	LOCATION: A Tank Farm	DATE: 6-25-19	Report #: 216
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
	18245144 DAN 18 0125		

SAMPLE# INTERVAL: %

K.O N/A

1 9'-11' see below

2 15'-17'

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9388 Tubing (2⅞) @ 0 to 26' ft bgs; S.U. 4'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	loaded 2⅞" drill string at shop
0613	Travel to 200 East
0640	Arrive at 200 East, pre job
0705	Pre job concludes, Ace in, pick up respiratory gear, pick up supplies at chem storage
0806	Enter farm, finish topping off cement at C-9395, Service rig, move rig and equipment to C-9388, set up at 35° angle off vertical
1046	Lunch
1217	Enter farm, drive 2⅞" pipe from 0 to 9' pulled inner rod, installed sampler drove and collected sample 9-11', installed tip and inner rod drove to 15', pulled inner rod, installed sampler, drove sampler 15' to 17', pulled and processed sample, installed tip and drove sample string to 26' (gyro depth).
1417	Exit farm, return gear to mask station, return to shop
1630	End of shift

SAMPLE RESULTS - 9-11' sample = shoe B3M4D6 = 100%, A liner B3M4D3 = 100% B liner B3M4D4 = 100% C liner B3M4D5 = 100%, 15-17' sample = shoe B3M4F3 = 100%, A liner B3M4F0 = 100%, B liner B3M4F1 = 100% C liner B3M4F2 = 50% Surface sample = B3M4N5

OPERATOR/LICENSE: Olson #1217

PERSONNEL: A. Hoopes, M. Weakley, O. Amos, C. Cutrah, N. Jenshen, Z. Nelson, P. Lynsy, J. Ortman

WEATHER/DOWNTIME: 83° mostly sunny

DISCARDED ITEMS: 6 sample liners, 12 sample caps, 3 gals diesel, 1 Lynch Pin, 2-o-ring

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 6-26-19	Report #: 217
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: E7-SH-SKA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-4788 Tubing (2¾) @ 26' to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0610	Travel to 200 East
0643	Arrive at 200 East, pre job
0704	Pre job concludes, ace in, pick up respiratory gear
0745	Stand by for air bottle delivery
0820	Enter farm, pull inner rod
0831	Begin Gyro operations trouble with equipment
0956	Exit farm, return equipment to 3 rivers scientific for problem diagnosis
1105	3 Rivers scientific determined problem to be in Gyro-probe itself, waiting for issue to be resolved
1630	End of shift

K.O. 6-26-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Catron, S. Ortman, Z. Nelson, N. Jenshen, P. Lynsy	WEATHER/DOWNTIME: 83° cloudy	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 6-27-19	**Report #:** 218
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** Ax-063	**AHA:** ET-SH-SHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C4388 Tubing (2 E/8) @ 26 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	No work performed in tank farms Gyro-tool shipped out for repairs, waiting for tool availibility in order to continue
1630	End of shift

K.O. 6-27-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, A. Hoopes

WEATHER/DOWNTIME: 86° clear

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: R2 Stettler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.J. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 7-1-19	**Report #:** 219
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125		
N/A	**BOREHOLE SUMMARY END OF SHIFT**	**GEOPHYSICAL LOGGING**	
	Borehole # C-9388 Tubing (2 5/8) @ 26 to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	Stand-by for gyroscope run to be performed at 26' bgs at C-9388 at 35° off vertical in 2 5/8" tubing
1630	End of shift

K.O. 7-1-19

OPERATOR/LICENSE: Kelly Olson #1217 **PERSONNEL:**	**WEATHER/DOWNTIME:** 92° sunny	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 7-2-19	Report #: 220
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SH-SH4-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245744 DAN 18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	

Borehole # 22C-938 Tubing (2 5/8) @ 26 to \ ft bgs; S.U. \

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

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

Boring # Interval: Type: N/A

TIME	WORK SUMMARY
0600	standing by for Gyro tool to be repaired and calibrated - to perform gyro run at 26' (required)
1630	End of shift

K.O. 7-2-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, A. Hoopes

WEATHER/DOWNTIME: 83° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Ol

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 7-3-19	**Report #:** 221
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO. / EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9388 **Tubing** (1 1/8) @ 26 **to** \ **ft bgs; S.U.** \		**Boring #** **Interval:** **Type**
	Borehole # ____ **Tubing** ( ) @ **to** **ft bgs; S.U.** ____		N/A
	Borehole # **Tubing** ( ) @ **to** **ft bgs; S.U.**		

TIME	WORK SUMMARY
0600	Standing by for Gyro tool to be repaired and calibrated before continuation of C-9388
1630	End of Shift
	Note: Also stop work in effect for respiratory equipment problems
	7-3-19 K.O.

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: R. Steffler, A. Hoopes	84° sunny	N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 07-08-19	**Report #:** 222
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9888 Tubing (2 5/8) @ 26 to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # C-9395 Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0611	Travel to 200 East
0646	Arrive at 200 East, pre job meeting
0711	Pre job concludes, Ace in, pick up respiratory gear
0827	Enter farm, install protective casing at C-9395 (2' x 10" unit)
0924	Exit farm, return gear to mask station
0940	Depth calibration was performed on Cart #1 at 200 west area
1136	No further work done inside tank farms, still standing by for repair to Gyro tool
1630	End of shift
	K.G. 07-08-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, R. Steffler, O. Amos, Z. Nelson, C. Cetron, P. Lynsy, J. Ortman	**WEATHER/DOWNTIME:** 85° mostly sunny	**DISCARDED ITEMS:** 1- 2'X10" protective casing

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 07-09-19	**Report #:** 223
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** E7-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 180125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C4389 Tubing (2⅝) @26 to \ ft bgs; S.U. \		**Boring #** **Interval:** **Type**
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	Aquired gyroscope for field use at tank farms, performed bench test at Richland shop and prepared equipment
1630	End of shift
	07-09-19 K.O.

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weekley, R. Steffler, O. Amos, A. Hoopes	**WEATHER/DOWNTIME:** 91° partly cloudy	**DISCARDED ITEMS:** N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 07-10-19	Report #: 224
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	1824544 DAN 180125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9388 Tubing (2 5/8) @ 26 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9388	0-26	Gyro

TIME	WORK SUMMARY
0609	Travel to 200 East
0642	Arrive at 200 East, pre job
0803	Enter farm, set up and perform 3 gyro runs at C-9388 at 35° off vertical
0846	Exit farm, return data to town to be reviewed.
0940	unable to down-load data for unknown reason, stand-by for resolution of problem
1630	End of shift

K.O. 07-10-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Catron, O. Amos, R. Steffler, A. Hoopes, J. Ortmann, N. Jenshen, Z. Nelson	WEATHER/DOWNTIME: 92° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: R. Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 07-11-19	Report #: 225
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9388 Tubing (2 5/8) @ 26 to \ ft bgs; S.U. \	Boring # C-9388 Interval: 0-26 Type Gyro	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0600	Testing Gyroscope at Nicholson shop
0731	Travel to 200 East
0802	Arrive at 200 East, Ace in, pick up respiratory gear
0831	Enter farm, perform 3 gyro runs, data appeared good from 1 survey
0916	Exit farm, take gyro results to town, stand-by for approval to proceed with driving 2 5/8" sample tubing.
1233	Enter farm attempt to acquire more data by taking 3 more gyro runs, un-able to obtain data.
1336	Exit Farm, return gear to mask station, stand-by to resolve gyro issues
1630	End of shift
	K.O. 07-11-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: O. Amos, A. Hoopes, J. Ortman, N. Jenshen, P. Lynsy	WEATHER/DOWNTIME: 92° mostly sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stettler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 07-15-19	Report #: 226
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9388 Tubing (2 3/8) @ 26 to \ ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	No work conducted in tank farms
	preparing to run new Gyro equipment
1630	End of shift

K.O 7-15-19

OPERATOR/LICENSE: Olson FF 1217 PERSONNEL: M. Weakley, A. Hopes	WEATHER/DOWNTIME: 78° showers	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stettler
TITLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly O	SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 33'	LOCATION: A Tank Farm	DATE: 7-16-19	Report #: 227
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9388 Tubing (2 5/8") @ 26' to 59 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9388	0-26	Gyro
C-9388	0-59	Gyro

TIME	WORK SUMMARY
0609	Travel to 200 East
0642	Arrive at 200 East, pre-job
0703	Pre-job conducted, Ace in, pick up respiratory equip,
0801	Enter farm, set up and perform gyro runs from 0-26'
0857	Exit farm, send in data and wait for approval to continue driving
1251	Received approval to continue, enter farm install inner rod, drove 2 5/8" sample string from 26' to 59" pulled inner rod, Ran 2 gyro runs at this depth.
1444	Exit farm, return gear to mask station, send data in from gyro to be reviewed
1520	Return to shop
1630	End of shift

K.O. 7-16-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: A. Hoopes, O. Amos, M. Weakley, C. Cadron, V. Jenshea, P. Lynsy, D. Curtis

WEATHER/DOWNTIME: 89° sunny

DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 52'	LOCATION: A Tank Farm	DATE: 7-17-19	Report #: 228
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-21A-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO. 1824544 DAN 18 0125	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4

SAMPLE#	INTERVAL:	%
1	63-65'	see Below

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4388 Tubing (2⅞) @ 54' to 111' ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
~~C-4388~~	~~0-54'~~	~~Gr~~
RZS 7-24-19		

TIME	WORK SUMMARY
0609	Travel to 200 East
0642	Arrive at 200 East pre-job
0802	Installed inner rod drove to 63; pulled inner rod, installed sampler, drove sampler 63'-65', pulled and processed, re-installed rod and drove to 80' b.g.s.
1025	Lunch
1214	Return from Lunch, Enter farm, drove from 80' to 111' letting head cool off as needed.
1414	Exit Farm to allow head to cool, retun gear to mask station
1430	Return to shop
1517	Hold-over cancelled due to inclement weather
1630	End of shift
	SAMPLE RESULTS, Shoe B3M4H0 = 100%, A liner B3M4F7 = 100%, B liner B3M4F8 = 100%, C-liner B3M4F9 = 100%
	7-17-19 K.O.

OPERATOR/LICENSE: Olson #217

PERSONNEL: A. Hooper, O. Amos, M. Weakley, C. Catron, J. Ortman, Z. Nelson, N. Jensen, P. Lynsy

WEATHER/DOWNTIME: 87° cloudy

DISCARDED ITEMS: 3 sample liner, 6 sample caps, 8 lynch pines, 3 'O' rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TLE : TEAM COGNIZANT PERSON

GNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 50'	**LOCATION:** A Tank Farm	**DATE:** 7-18-19	**Report #:** 229
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** EP-SH-JYA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.** 18245144 DAN 18 0125	**HHU CASE #1** HHU XL #3	**HHU CAT #2** **HHU CAT #4**

SAMPLE#	INTERVAL:	%
1	124-126'	see below
2	141'-143'	

BOREHOLE SUMMARY END OF SHIFT

Borehole # 24386 Tubing (2 5/8) @ 111' to 161' ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0643	Arrive at 200 East - pregob
0710	Pre-job concludes, ace in, pick up respiratory protection
0827	Enter farm, drive sample string from 111' to 124' pull inner rod, install sampler, drive and process sample, install inner rod, drive 2 5/8" sample string from 126' to 141' at 35° off vertical, pull inner rod, install sampler, drive and pull sampler, NCO's process sample, install inner rod, drive from 143' to 161' bgs (next sample point) pull inner rod and secure site.
	Utilized two drill teams alternating performing work and changing out air bottles and breaks.
	75% work and 25% rest in effect from 1100 to 1400 due to heat.
1403	Exit farm, return gear to mask station
1431	Return to shop
	SAMPLE RESULTS = 124-126, shoe B3M4H7 = 0%, A liner B3M4H4 = 100%, B liner B3M4H5 = 100%, C liner B3M4H6 = 25%
	141-143 - Shoe B3M4J4 = 100% A liner B3M4J1 = 100% B liner B3M4J2 = 100%, C liner B3M4J3 = 100%
1630	End of shift
	K.O. 7-18-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: O. Amos, A. Hoopes, M. Weakley, C. Catron, J. Ortman, D. Curtis, A. Pope Z. Nelson

WEATHER/DOWNTIME: 87° sunny, windy

DISCARDED ITEMS: 6 sample liners, 12 sample caps, 2 lynch pins, 3-0-rings, 8 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stoffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 25'	LOCATION: A Tank Farm	DATE: 7-22-19	Report #: 230
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JH A-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	15245144 DAN 180125	HHU XL #3	HHU CAT #4

SAMPLE#	INTERVAL:	%
1	161-163'	See below
2	184'-186'	

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9388 Tubing (2 5/8) @ 161 to 186 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
		N/A

TIME	WORK SUMMARY
0612	Travel to 200 East
0642	Arrive at 200 East, pre job meeting
0712	Prejob concludes, Acc in, pick up respiratory gear
	Stand by for AOP-014 (Lightening)
1157	Exit AOP-14, On 75% work - 25% rest regiment,
	enter farm install inner rod and sampler, drive and
	pull sampler Begin installing tip and inner rod
1435	Exit farm return gear to mask station
1452	Return to shop
	SAMPLE RESULTS = 161-163', Shoe B3M4K1 = 100%
	A liner B3M4J8 = 100%, B liner B3M4J9 = 100%
	C liner B3M4K0 = 100%
1530	SWING SHIFT CREW TRAVELED TO 200W SMUPT
1630	PRE JOB
1700	ARRIVED AT A FARM
1730	ENTERED FARM AND PUSHED 21 FT TO SAMPLE DEPTH ~~163-184~~ 184-186 RZS 8-1-19
1900 ~~1800~~	EXITED FARM TO TAKE HEAT REGIMENT REST AND HEAD COOL DOWN.
1930	ENTERED FARM, BACK PULLED RODS, INSPECTED SAMPLER. PUSHED SAMPLE.
	REMOVED SAMPLE
2150	EXITED FARM
2230	ARRIVED BACK SHOP
	SAMPLE RESULTS: 184-186, Shoe B3M4K8 = 20% A liner B3M4K5 = 100%
	B liner B3M4K6 = 100% C liner B3M4K7 = 100%

OPERATOR/LICENSE: Olson #1217	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Catron, P. Lynn, D. Curtis, E. Cope	98° Thunderstorms	7 gals Diesel, 6 sample liners, 12 sample caps

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: R.Z. Stoffer / RZ Stoffer
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Stoffer

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 21'	**LOCATION:** A Tank Farm	**DATE:** 7-23-19	**Report #:** 231
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** **%**	18245144 DAN 180125	HHU XL #3	**HHU CAT #4**
1 203-205 see below	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9388 **Tubing** (2 5/8) @ 186 to 207 **ft bgs; S.U.** 3		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\) @ \ to \ **ft bgs; S.U.** \		N/A
	Borehole # \ **Tubing** (\) @ \ to \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0613	Travel to A-Farm
0642	Arrive at 200 East, pre job
0705	Pre job concludes, ace in, pick up respiratory gear
0801	Enter farm, install inner rod, drive ~~sample~~ from 186' to 203' with 2 5/8" sample string, pull tip and inner rod, install sampler drive sample from 203' to 205', pulled and processed sample, installed inner rod and tip and drove from 205 to 207'.
1136	Exit farm, Lost NCO support due to work on equipment blanks
1206	Travel to shop

Sample results K.O. 7-23-19
Shoe B3M4L5 - 100%
A Liner - B3M4L2 - 100%
B Liner = B3M4L3 - 100%
C Liner = B3M4L4 - 100%
RZS 8-1-19
Equipment Blank = B3M4N3 B3M4N4
Field Blank = B3M4N1 B3M4N2 RZS 8-1-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** A. Hoopes, O. Amos, M. Weakley, C. Catron, Z. Nelson, N. Jenshen, E. Pope	**WEATHER/DOWNTIME:** 98° sunny	**DISCARDED ITEMS:** 3 sample liners 6 sample caps 1 O' ring 5 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 80'	**LOCATION:** A Tank Farm	**DATE:** 7-24-19	**Report #:** 232
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** Ax-063	**AHA:** ET-SH-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 180125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole #C-4388 Tubing (2¾") @207 to 287 ft bgs; S.U. 3		Boring # Interval: Type
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0605	Travel to 200 East
0640	Arrive at 200 East, pre-job
0703	Pre-job concludes, gear in, pick up respiratory gear
0745	Enter Farm, drive from 207' to 247' at 35° off vertical, allowing the head to cool as needed
1012	Exit farm, allow head to cool, lunch
1156	Enter Farm, drive from 247' to 267', very hard areas from 255' to 263', letting head cool as needed
1506	Exit farm, return gear to mask station /End of day shift
1530	START OF SWING SHIFT.
1630	PRE-JOB 2074 BUILDING
1800	ARRIVED AT A FARM
1810	ENTERED FARM
1830	EXITED FAR HEAD COOL DOWN, PUSHED 263-267
1900	ENTERED FARM
1920	EXITED FARM HEAD COOL DOWN PUSHED 267-271
1950	ENTERED FARM
2010	EXITED FARM HEAD COOL DOWN PUSHED 271-274
2045	ENTERED FARM
2100	EXITED FARM HEAD COOL DOWN PUSHED 274-278
2120	ENTERED FARM
2150	EXITED FARM HEAD COOL DOWN PUSH 278-287
2300	END OF SHIFT

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** K. Olson, A. Hooper, D. Amos, M. Weakley, Z. Nelson, C. Cotton, E. Pope, N. Jenshen	**WEATHER/DOWNTIME:** 86° sunny	**DISCARDED ITEMS:** 13 LYNCH PINS 14 gals diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stettler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 5'	LOCATION: A Tank Farm	DATE: 7-25-19	Report #: 253
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EI-SH-JHA 005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
1 290-292 see below	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-3388 Tubing ( )@ to ft bgs; S.U.	Boring # Interval: Type	
	Borehole # \ Tubing (\)@ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\)@ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0613	Travel to 200 East
0644	Arrive at 200 East, pre-job
0708	Pre-job concludes, Ace in, pick up respiratory protection
0749	Enter farm drive from 287' to 290' b.g.s., pull inner rods and tip, install sampler and inner rod, Hook up and drive sampler from 290' to 292', back pull inner rod in 4' sections and sampler
1103	Exit farm operators processed sample, return sear to mask station
1206	Sample processed, return to shop, stand by to run gyro survey on upcoming monday
1630	End of shift
	SAMPLE RESULTS = Shoe B3M4M2 = 100%
	A liner B3M4L9 = 100% B liner B3M4M0 = 75%,
	C liner B3M4M1 = 100%
	K.O. 7-25-19

OPERATOR/LICENSE: Olson #1217
PERSONNEL: A. Hoopes, M. Weckley, R. Steffler, C. Cotson

WEATHER/DOWNTIME: 94° sunny

DISCARDED ITEMS: 4 Lynch pins, 3 sample liners, 6 sample caps, 2 'o' rings

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 7-29-19	Report #: 234
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SH-HA-003
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4388 Tubing (2 5/8) @ 29 to \ ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
C-9388	0-200'	Gyro

TIME	WORK SUMMARY
0611	Travel to A-Farm
0643	Arrive at 200 East, pre job
0709	Pre job concludes, are in, pick up respiratory gear
0805	Enter farm, set up and begin gyro runs, running gyro tool on inner rod and stopping every 5' to equive data.
1053	Gyro completed to 125', exit farm for lunch
1157	Enter farm, run gyro survey from 125' to 200'
1332	Pull inner rods and gyro, down-load data
1437	Return gear to mask station
1503	Return to shop
1630	End of shift

K.O. 7-29-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: R. Steffler, A. Hooper, C. Catron, Z. Nelson, N. Jenshen, E. Copey, J. Ortan	WEATHER/DOWNTIME: 95° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 60' pulled	LOCATION: A Tank Farm	DATE: 7-30-19	Report #: 235
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SHJ-HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9388 Tubing (6 5/8") @ 291 to 232 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring # C-9388 Interval: 200'-290' Type: Gyro

TIME	WORK SUMMARY
0612	Travel to 200 East
0641	Arrive at 200 East, pre job
0704	Pre job concludes, see in, pick up respirator, gear
0803	Enter farm, install Gyro tool on inner rod to 200', perform gyro survey from 200' to 290', pull inner rod and tool, down-load data
1100	Lunch
1230	Enter farm back pull 2 5/8" casing from 291' to 256', install 1" PVC, fill with bentonite crumbles and back pull from 256' to 231', PVC became plugged at this point and exited farm to determine course of action.
1442	Return gear to mask station
1502	Return to shop
1630	End of shift

K.O. 7-30-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: R. Steffler, O. Amos, A. Hoopes, C. Cadron, M. Repko, P. Lynch, Z. Nelson, J. Ortman

WEATHER/DOWNTIME: 940 sunny

DISCARDED ITEMS: 4 sacks bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.J. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 231' pulled	LOCATION: A Tank Farm	DATE: 7-31-19	Report #: 236
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: 4X-063	AHA: ET-SHA-HA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C4388 Tubing (2 5/8) @ 231 to 0 ft bgs; S.U. 1

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0611	Travel to 200 East
0642	arrive at 200 East, pre-job meeting
0702	Pre job concludes, Ace in, pick up respiratory gear
0759	Enter farm, pull 1" PVC Tremie out of 2 5/8" outer rod, clear bentonite bridge, back pull pipe from 231' to 221', tag hole, install new 1" PVC Tremie, back pull from 221' to 0' while back-filling with bentonite, pull retaining nails on plate and clean-up
1228	Exit Farm return materials to Chem-storage and gear to mask station
1306	Return to shop, prepare moisture probes for installation
1630	End of shift

K.O. 7-31-19

OPERATOR/LICENSE: Olson # 1217

PERSONNEL: A. Hoopes, O. Amos, M. Weakley, C. Catron, P. Lynsy

WEATHER/DOWNTIME: 94° sunny

DISCARDED ITEMS: 13 sacks bentonite, 1-2 5/8 tip holder, 1 inner rod tip, 5 gal diesel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Stettler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 1' Pulled	**LOCATION:** A Tank Farm	**DATE:** 08-01-19	**Report #:** 237
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA-605
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	**HHU XL #3**	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9387 **Tubing** 2½") @ 0 to 297 ft bgs; **S.U.** 5'		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** ( ) @ \ to \ ft bgs; **S.U.** \		N/A
	Borehole # \ **Tubing** ( ) @ \ to \ ft bgs; **S.U.** \		

TIME	WORK SUMMARY
0613	Travel to 200 East
0641	Arrive at 200 East, Pre job
0702	Pre job concludes, ace in, pick up respiratory gear
0736	NCO's moving tubing and equipment from C-9388 and to C-9387
0827	Enter farm, move and set up rig on C-9387, Run inner rod to 298', pull outer casing 2" and check for integrity of outer pipe. Outer string un-broken, pulled an additional 10" and Knocked out expendable tip, pulled inner rod.
1043	Exit farm, Lunch
1232	Enter farm, operators move grouting equipment to site, secure site, prep for grouting
1306	Exit farm, return gear to mask station
1630	End of shift
	K.O. 8-01-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** O. Amos, A. Hooper, M. Weakley, J. Ortman, P. Lynn, N. Jersey, Z. Nelson	**WEATHER/DOWNTIME:** 100% clear	**DISCARDED ITEMS:** 1 2½" expendable tip

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 43' pulled	**LOCATION:** A Tank Farm	**DATE:** 8-5-19	**Report #:** 238
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** Ax-063	**AHA:** ET-SH-JHA 005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**
SAMPLE# / **INTERVAL:** / **%**	18245144 / DAN 180125		
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9387 Tubing (2½) @ 297 to 255 ft bgs; S.U. 8'		**Boring #** / **Interval:** / **Type**
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0611	Travel to 200 East
0641	Arrive at 200 East, pre job
0703	Pre job concludes, ace in, pick up respirator, gear
0820	Enter farm, back pull casing from 297 to 288', install multi level prope. and tremie tubing, back pull casing to 259', install grout and flush tubing with clean water, pull casing to 255'. stop at this point to allow grout to set before pulling any more casing.
1006	Exit farm, return gear to mask station
1032	Return to shop, prep for next probe installation
1630	End of shift

K.O. 8-5-19

OPERATOR/LICENSE: Olson # 1217	**WEATHER/DOWNTIME:**	**DISCARDED ITEMS:**
PERSONNEL: O. Amos, M. Weakley, R. Steffler, C. Catron, J. Ortman, P. Lynsy, Z. Nelson	99° Hot	9.6 lb cement 20.4 lb pumice 1 multi level probe

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 96' pulled	LOCATION: A Tank Farm	DATE: 8-6-19	Report #: 239
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-DHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C4387 Tubing ($2\frac{1}{2}$) @ 25 to 159' ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0612	Travel to 200 East
0643	Arrive at 200 East, pre job
0706	Pre-job concludes, ace in, pick up respiratory gear
0751	Enter farm, back pull $2\frac{1}{2}$" casing from 255' to 159' bgs, stopping every 24' and installing cement grout via $\frac{1}{2}$" poly tubing tremie.
1012	Entered 75% rest and 25% work resiment entered farm, rinsed tremie tubing and $2\frac{1}{2}$" bore and secured site
1040	Lunch
1300	Pre-job for 8-7-19
1315	Pre-job concludes, no work in farms in P.M. due to heat resiments.
1630	End of shift
	8-6-19 K.O.

OPERATOR/LICENSE: Olson #1217

PERSONNEL: A. Hoopes, M. Weekley, C. Catron, J. Ortman, Z. Nelson

WEATHER/DOWNTIME: 105° Hot

DISCARDED ITEMS: 1 36" aluminum wrench, 1 Nylatrol washer, 38.4 lbs - cement, 81.6 lbs Pumice

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TLE : TEAM COGNIZANT PERSON

GNATURE: Kelly Olson

REVIEWED BY: RZ Stettler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Stettler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 80' pulled	LOCATION: A Tank Farm	DATE: 8-7-19	Report #: 240
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18 0125	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-9387 Tubing (1½) @ 159 to 79 ft bgs; S.U. 3'		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0608	Travel to 200 East
0640	Arrive at 200 East, pick up respiratory gear, Ace in
0701	Arrive at farm, prep for entry
0714	Enter farm on 75% work 25% rest Heat regiment, back-pull casing from 159' to 111', installed 2 lifts of grout
0804	Exit farm, enter 50% work 50% rest heat regiment
0840	Enter farm, install 3rd lift of grout, back pull 2½" casing from 111' to 79' b.g.s., rinse tubing and bore, secure site
0911	Exit farm for half hour rest
0931	Enter 25% work, 75% rest heat regiment, return gear to mask station, no more work performed in tank farms due to heat regiments.
1004	Return to shop, prep for upcoming probe installations
1630	End of shift

K.O. 8-7-19

OPERATOR/LICENSE: Olson #127	WEATHER/DOWNTIME:	DISCARDED ITEMS:
PERSONNEL: A. Hoopes, M. Weakley, P. Lynsy, Z. Nelson, J. Ortman, C. Catron	104° hot	28.8 lbs cement 61.2 lbs pumice

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 76' pulled	LOCATION: A Tank Farm	DATE: 8-8-19	Report #: 241
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: % N/A	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9387 Tubing (2½") @ 79' to 3' ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0608	Travel to 200 East
0647	Arrive at 200 East, Ace in, pick up respiratory gear
0705	Enter farm, NCO's remove water tank and fill prior to grouting
07:48	begin grouting and back pulling 2½" casing
0809	Compressor shuts down, exit farm and await replacement
0834	New compressor arrives, continue grouting and back-pulling from 79' to 3' bgs
1003	Enter 50/50 work regiment
1015	Enter farm install 2 more lifts of grout (some problems with discharge line plugging with fibre material)
1046	Exit farm - lunch
1217	Enter farm, continue adding lifts of grout on 50/50 work regiment
1403	Exit farm, allow grout to set up, return gear to mask station
1435	Return to shop
1630	End of shift
	8-8-19

OPERATOR/LICENSE: Kelly Olson #1217 PERSONNEL: M. Weekley, A. Hoopes, J. Ortman, Z. Nelson, P. Lynsy	WEATHER/DOWNTIME: 99° cloudy	DISCARDED ITEMS: 163.2 lbs pumice 76.8 lbs cement

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 3' pulled	LOCATION: A Tank Farm	DATE: 8-12-19	Report #: 242
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JKA-007
SAMPLING SUMMERY SAMPLE# INTERVAL: % N/A	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18-0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

BOREHOLE SUMMARY, END OF SHIFT

Borehole # C9387 Tubing (2½") @ 3' to 0 ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0613	Travel to 200 East
0640	Arrive at 200 East, pre-job
0708	Pre job ends, pickup respiratory gear, Ace in
0811	Enter farm, pull remaining 3' of 2½" drill rod, tag cement grout at approximately 50' b.g.s, mixed and added 4 more batchs of grout.
0905	Exit farm, allow grout to set
1207	Enter farm, mix an additional 4 batchs of grout and add to boring.
1256	Exit farm to allow grout to set up over night.
1309	Return gear to mock station
1351	Return to shop
1630	End of shift

K.O. 8-12-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: A. Hoopes, O. Amos, M. Weakley, C. Catron, J. Ortman, Z. Nelson

WEATHER/DOWNTIME: 83° sunny

DISCARDED ITEMS: 76.8 lb cement, 163.2 lb pumice

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-13-19	Report #: 243
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 DAN 18015	HHU XL #3	HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT		GEOPHYSICAL LOGGING
	Borehole # C-4387 Tubing (\ ) @ \ to \ ft bgs; S.U. \		Boring # Interval: Type
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0613	Travel to 200 East
0642	Arrive at 200 East, pre-job meeting
0712	Pre job concludes, Ace in, pick up respiratory gear
0807	Enter farm, tag cement grout at 30' b.g.s., mix 3 more batch's of grout and fill boring to surface, pull retaining rod's from plate, dug in and set protective casing over probe wire.
1042	Return gear to mask station, no other work done in tank farm due to crane blocking access to next locations.
1630	End of shift
	K.O. 8-13-19

OPERATOR/LICENSE: Olson # 1217 PERSONNEL: A. Hoopes, O. Amos, M. Weakley, C. Catron, Z. Nelson, E. Pope	WEATHER/DOWNTIME: 85° sunny	DISCARDED ITEMS: 1 2' X 10" protective casing 28.8 lbs cement 61.2 lbs pumice 1 sack bentonite

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Stoffler

ERT Installation Data Sheet

Project: A-Farm Focus Area 1
Contract 65210.009

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Borehole#: C9387

ERT Bottom Electrode Set Depth (ft): 295.6'
S/N 0519635728-1-99 (1)

Lift # 1 — Initial Set

Date:	8-5-19	**Grout Mix**	
Initial Tag (ft):	298	Cement (lbs):	9.6
Bottom of Tubing (ft):	NA	Pozzolon (lbs):	20.4
Depth Start (ft):	298'	Water (lbs):	2.5
Depth Finish (ft):	262'	Total Vol. Mixed (gal):	≈ 3.5
Total Lift (ft):	36'	Total Vol. Pumped (gal):	3.5
Time Start:	0823		
Time Finish:	0950	Flush Water (gal):	2
Total Time:	1 hr. 27 min.	Final Rinse (pump)	4 gal.
		Down pipe	2 gal.

Comments: Bottom probe is 2.4' from bottom of weight. 0842, Probe landed. 0903 All rod pulled, Pause due to no generator. Pulled ≈ 30' tubing. Pulled one rod after grouting

Lift # 2

Date:	8-6-19	**Grout Mix**	
Initial Tag:	N/A	Cement (lbs):	9.6
Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4
Depth Start:	262'	Water (lbs):	2.5
Depth Finish:	238	Total Vol. Mixed (gal):	≈ 3.5
Total Lift Ft.:	24	Total Vol. Pumped (gal):	~~3.5~~ 3.5
Time Start:	8:13		
Time Finish:	8:22	Flush Water (gal):	1st ≈ 2 GAL
Total Time:	9	CEMENT RINSE	2nd ≈ 1.5 GAL

Comments:
PULLED SIX JOINTS

Lift # 3

Date:	8-6-19	**Grout Mix**	
Initial Tag:	N/A	Cement (lbs):	9.6
Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4
Depth Start:	238	Water (lbs):	2.5
Depth Finish:	~~224~~ 212	Total Vol. Mixed (gal):	≈ 3.5
Total Lift Ft.:	26	Total Vol. Pumped (gal):	~~3.5~~ ~~6.0~~ 3.5
Time Start:	0830		
Time Finish:	0920	Flush Water (gal):	1st ≈ 2.5 AFTER CEMENT PUMP
Total Time:	50 MIN		

Comments:
JOINT 53

ERT Installation Data Sheet

Project: A-Farm Focus Area 1
Contract 65210.009

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Borehole#: ~~C9388~~ C9387 **ERT Bottom Electrode Set Depth (ft):** 295.6

Lift # 4				
	Date:	8-6-19	Grout Mix	
	Initial Tag (ft):	N/A	Cement (lbs):	9.6
	Bottom of Tubing (ft):	N/A	Pozzolon (lbs):	20.4
	Depth Start (ft):	212	Water (lbs):	2.5
	Depth Finish (ft):	184	Total Vol. Mixed (gal):	≈ 3.5
	Total Lift (ft):	28	Total Vol. Pumped (gal):	6.0
	Time Start:	0930		
	Time Finish:	0940	Flush Water (gal):	1ST ≈ 1 GAL
	Total Time:			2ND ≈ 2 GAL AFTER ~~SEMES~~ MIX PUMP

Comments:
PULLED 7 JOINTS

Lift # 5				
	Date:	8-6-19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4
	Depth Start:	184	Water (lbs):	2.5
	Depth Finish:	160	Total Vol. Mixed (gal):	3.5
	Total Lift Ft.:	~~20~~ 24	Total Vol. Pumped (gal):	
	Time Start:	0940		
	Time Finish:	0735	Flush Water (gal):	1ST ≈ 1 GAL
	Total Time:			2ND ≈ 2 GAL AFTER CEMENT, MIX ADD.

Comments:
THIS LIFT CARRIED OVER TO AUG. 7

Lift # 6				
	Date:	8-7-19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4
	Depth Start:	160	Water (lbs):	2.5
	Depth Finish:	136	Total Vol. Mixed (gal):	3.5
	Total Lift Ft.:	24	Total Vol. Pumped (gal):	3.5
	Time Start:	0735		
	Time Finish:	0755	Flush Water (gal):	1ST ≈ 3 GAL AFTER CEMENT, MIX ADD.
	Total Time:	20 min		

Comments:

ERT Installation Data Sheet

Project: A-Farm Focus Area 1
Contract 65210.009

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Borehole#: ~~C9388~~ C9387

ERT Bottom Electrode Set Depth (ft): 295.6

Lift # 7				
	Date:	8-7-19	Grout Mix	
	Initial Tag (ft):	N/A	Cement (lbs):	9.6
	Bottom of Tubing (ft):	N/A	Pozzolon (lbs):	20.4
	Depth Start (ft):	136	Water (lbs):	2.5
	Depth Finish (ft):	112	Total Vol. Mixed (gal):	3.5
	Total Lift (ft):	24	Total Vol. Pumped (gal):	≈ 3.5
	Time Start:	0759		
	Time Finish:	0855	Flush Water (gal):	1ST ≈ 3 GAL AFTER CEMENT MIX ADD
	Total Time:	56 min		
	Comments:			

Lift # 8				
	Date:	8-7-19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4
	Depth Start:	112	Water (lbs):	2.5
	Depth Finish:	80	Total Vol. Mixed (gal):	3.5
	Total Lift Ft.:	30	Total Vol. Pumped (gal):	≈ 3.5
	Time Start:	0900		
	Time Finish:	0754	Flush Water (gal):	1ST ≈ 1 GAL
	Total Time:			2ND ≈ 3 GAL AFTER CEMENT MIX ADD
	Comments: CARRIED OVER TO NEXT DAY 8-8-19			

Lift # 9				
	Date:	8-8-19	Grout Mix	
	Initial Tag:	N/A	Cement (lbs):	9.6
	Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4
	Depth Start:	80	Water (lbs):	2.5
	Depth Finish:	52	Total Vol. Mixed (gal):	3.5
	Total Lift Ft.:	30	Total Vol. Pumped (gal):	≈ 3.5
	Time Start:	0810		
	Time Finish:	0909	Flush Water (gal):	1ST 1 GAL
	Total Time:	59 min		2ND ≈ 3 GAL AFTER CEMENT MIX ADD
	Comments:			

ERT Installation Data Sheet

Project: A-Farm Focus Area 1
Contract 65210.009

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Borehole#: ~~C9388~~ C9387

ERT Bottom Electrode Set Depth (ft): 295-6

Lift # 10

Date:	8-8-19	Grout Mix	
Initial Tag (ft):	N/A	Cement (lbs):	9.6
Bottom of Tubing (ft):	N/A	Pozzolon (lbs):	20.4
Depth Start (ft):	52	Water (lbs):	2.5
Depth Finish (ft):	28	Total Vol. Mixed (gal):	3.5
Total Lift (ft):	24	Total Vol. Pumped (gal):	≈ 3.5
Time Start:	0915		
Time Finish:	0940	Flush Water (gal):	1ST 1 GAL
Total Time:	25 min		2ND ≈ 3 GAL AFTER CEMENT MIX ADD.

Comments:

Lift # 11

Date:	8-8-19	Grout Mix	
Initial Tag:	N/A	Cement (lbs):	9.6
Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4
Depth Start:	24	Water (lbs):	2.5
Depth Finish:	12"	Total Vol. Mixed (gal):	3.5
Total Lift Ft.:	23	Total Vol. Pumped (gal):	≈ 3.5
Time Start:	0920		
Time Finish:	0940	Flush Water (gal):	1ST ≈ 3 GAL AFTER CEMENT MIX ADD.
Total Time:	20		

Comments:
FILLING UP LAST BIT OF SURFACE SEAL

Lift # 12

Date:	8-8-19	Grout Mix	
Initial Tag:	NA	Cement (lbs):	9.6 X 3
Bottom of Tubing:	N/A	Pozzolon (lbs):	20.4 X 3
Depth Start:	12"	Water (lbs):	2.5 X 3
Depth Finish:	0"	Total Vol. Mixed (gal):	3.5 X 3
Total Lift Ft.:	FILL TO SURFACE	Total Vol. Pumped (gal):	≈ 3.5
Time Start:	N/A ~~12:34~~		
Time Finish:	N/A	Flush Water (gal):	
Total Time:			

Comments:
ADDED 2 ADDITIONAL BATCH BUT STILL NO CEMENT COMING UP HOLE ADDED 12 ADDITIONAL BATCHES TO REACH SURFACE

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 1' pulled	LOCATION: A Tank Farm	DATE: 8-14-19	Report #: 244
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AK-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 180125	HHU CASE #1 HHU CAT #2 HHU XL #3 HHU CAT #4	

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9393 Tubing (2½) @ 285 to 294 ft bgs; S.U. 2'

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0712	Travel to 200 East
0741	Arrive at 200 East, pre-job meeting
0714	Pre job concludes Acc in, pick up respiratory gear
0803	NCO's enter farm, fuel rig, top off water tank, move un-needed pipe and equipment from C.9387
0937	Crane moved out of way, enter farm, make site to site move and set up on C-9393 and prep for running inner rod to Knock out tip
1033	Exit farm - Lunch
1228	Enter farm at 50/50 work resiment, install inner rod to 295', back pull outer casing and check for outer string integrity, pipe was intact, pull outer pipe from 295' to 294', Knock out expendable tip
1341	Enter 25% work, 75% rest resiment, exit farm return gear to mask station
1409	Return to shop
1630	End of shift

OPERATOR/LICENSE: Olson #1217 PERSONNEL: A. Hoopes, O. Amos, M. Weakley, E. Pope, Z. Nelson	WEATHER/DOWNTIME: Sunny 94°	DISCARDED ITEMS: 5 gals diesel 1 2½" expendable tip

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TLE : TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
ENATURE: Kelly Ol	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 39' pulled	LOCATION: A Tank Farm	DATE: 8-15-19	Report #: ~~255~~ 245
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ES-SH-AHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4
N/A	BOREHOLE SUMMARY END OF SHIFT Borehole # C-9343 Tubing (2½) @ 294 to 255 ft bgs; S.U. 3' Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \ Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	GEOPHYSICAL LOGGING Boring # Interval: Type N/A	

TIME	WORK SUMMARY
0620	Travel to 200 East
0640	Arrive at 200 East, Ace in, pick up respiratory gear
0700	stand-by for NCO lead
0917	NCO lead arrives enter farm pull 75 joints of inner rod used to knock out tip, back pull 2½" casing at 15° off vertical from 294' to 287' install multi level probe and poly tubing to 295' bgs, back pull 2½" casing from 287' to 255', mix and install one lift of grout (cement-pumice mix) flush lines and pump, pull poly tubing to 267', clean up and exit farm.
1147	At 50/50 work regiment, exit farm to allow cement-pumice grout to set for 24 hr minimum, return gear to mask station.
1221	Travel to shop
1630	End of shift
	K.O. 8-15-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Cotron, Z. Nelson, E. Pope	WEATHER/DOWNTIME: 93° sunny	DISCARDED ITEMS: 9.6 lb cement 20.4 lb pumice 1 multi level probe

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: K. Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 24' pulled	**LOCATION:** A Tank Farm	**DATE:** 8-19-19	**Report #:** ~~256~~ 246
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-J HA-005
SAMPLING SUMMERY	**U-DIG NO.** 18245144 / **EXCAVATION PERMIT NO.** DAN 18-0125	**HHU CASE #1** / **HHU XL #3**	**HHU CAT #2** / **HHU CAT #4**

SAMPLE# **INTERVAL:** **%**

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9393 Tubing (2½") @ 255 to 231 ft bgs; S.U. 3'

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

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

GEOPHYSICAL LOGGING

Boring #	Interval:	Type
N/A		

TIME	WORK SUMMARY
0612	Travel to 200 East
0640	Arrive at 200 East, pre job
0713	Pre job concludes. Aes in, pick up respiratory gear
0821	Enter farm, back pull 2½" rod from 255' to 231', set up to install grout and found poly tubing to be plugged, secure site and exit farm to evaluate situation.
0932	Return gear to mask station
1601	Return to shop and plan for alternative method to finish probe installation at C-9393
1630	End of shift

8-19-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, O. Amos, C. Catron, Z. Nelson, J. Ortman, D. Curtis,

WEATHER/DOWNTIME: 92° sunny

DISCARDED ITEMS: 9.6 lb cement, 20.4 lb pumice

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-20-19	Report #: 247 257
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY SAMPLE# INTERVAL: %	U-DIG NO. / EXCAVATION PERMIT NO. 18245144 DAN 18 0125	HHU CASE #1 HHU XL #3	HHU CAT #2 HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-4393 Tubing (1/2) @23 to \ ft bgs; S.U. 1

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0600	No work conducted in tank farm due to loss of NCO support and time constraints for installing cement grout
1630	End of shift

K.O. 8-20-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley	WEATHER/DOWNTIME: 97° sunny	DISCARDED ITEMS: N/A

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson
TITLE: TEAM COGNIZANT PERSON
SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler
TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 231' pulled	LOCATION: A Tank Farm	DATE: 8-21-19	Report #: 248
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: ET-SH-SH4005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU CAT #2	HHU XL #3 / HHU CAT #4
	18245144 DAN 18 0125		

SAMPLE# INTERVAL: %

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9393 Tubing (2½") @ 231' to 0' ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0603	Travel to 200 East
0639	Arrive at 200 East, Ace in, pick up respiratory gear
0712	Enter farm, back pull 2½" casing from 231' to 212'
0732	Problems with generator for operating pump and drill motor, exit farm, Replace generator
0755	Enter farm, utilizing two drill teams to insure steady work flow, back pulled 2½" casing from 212' to 0', stopping every 40' and installing two batchs of cement-pumice grout, approximately 4 gals per batch.
1115	Exit farm, clean diaphram pump
1130	Lunch
1246	Picked up replacement compressor at 8' farm connex,
1320	Return to shop, prep for next probe installation
1630	End of shift

K.O. 8-21-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, O. Amos, R. Steffler, P. Templeton, C. Catron, J. Ortman, K. Olson

WEATHER/DOWNTIME: 90° cloudy

DISCARDED ITEMS: 124.8 lb cement, 265.2 lb pumice

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-22-19	Report #: ~~239~~ 249
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AT-063	AHA: ET-SH-AHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18245144 DAN 18 0125		

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9393 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

N/A

TIME	WORK SUMMARY
0713	Travel to 200 East
0742	Arrive at 200 East, pre-job
0720	Pre-job concludes, Ace in, pick up respirators gear
0814	Enter farm, set up and pull 4 retaining 'nails' at C-9393, move plate, continue mixing cement-pumice grout installed 12 batchs and brought grout to surface, dug in and installed 2' x 10" protective casing
1103	Lunch
1304	Enter farm at 50/50 work resiment, lubed rails on mast, greased rig, set up upper plate on c-9391
1329	Exit farm, return gear to mask station
1402	Return to shop
1630	End of shift

K.O. 8-22-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, C. Catron, J. Ortman, P. Templeton, J. Fracess, E. Pope

WEATHER/DOWNTIME: 86° partly cloudy

DISCARDED ITEMS: 1 10"x2' protective casing

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	**LOCATION:** A Tank Farm	**DATE:** 8-26-19	**Report #:** ~~260~~ 250
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** E7-SK-JHA-005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 18 0125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 **Tubing** (2½) @ 279 **to** \ **ft bgs; S.U.** \		**Boring #** **Interval:** **Type**
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		N/A
	Borehole # \ **Tubing** (\ ) @ \ **to** \ **ft bgs; S.U.** \		

TIME	WORK SUMMARY
0713	Travel to 200 East
0744	Arrive at 200 East, pre-job
0715	Pre job concludes, Ace in, pick up respiratory gear
0813	Enter farm, pull nails at C-9395, operators move out un-needed rod and equipment with fork-lift move needed rod and equipment to C-9391, set up rig on C-9391 at 30° off vertical, begin installing inner rod to drive out tip.
1042	Lunch
1213	Enter farm, finish installing inner rod to 279' back-pulled outer casing approximately 3", inner rod failed to lift with outer pipe and required very little torque to turn, leading us to beleive there could be broken casing, pulled inner rod and prepared for camera survey.
1414	Exit farm, return gear to mask station
1436	Return to shop
1630	End of shift
	8-26-19 K.O

OPERATOR/LICENSE: Olson #1217	**WEATHER/DOWNTIME:** 84° Sunny	**DISCARDED ITEMS:** 1 sack bentonite
PERSONNEL: M. Weckley, C. Citron, J. Ortman, Z. Nelson, E. Pope, P. Templeton		

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Stoffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	**SIGNATURE:** R.Z. Stoffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 20' pulled	**LOCATION:** A Tank Farm	**DATE:** 8-27-19	**Report #:** 257
START CARD NO. RE15990	**DECOMMISSION NO.** AE49130	**RWP:** AX-063	**AHA:** ET-SH-JHA 005
SAMPLING SUMMERY	**U-DIG NO.** / **EXCAVATION PERMIT NO.**	**HHU CASE #1**	**HHU CAT #2**
SAMPLE# **INTERVAL:** %	18245144 DAN 180125	HHU XL #3	**HHU CAT #4**
N/A	**BOREHOLE SUMMARY END OF SHIFT**		**GEOPHYSICAL LOGGING**
	Borehole # C-9391 Tubing (2½) @ 279' to 217' ft bgs; S.U. 3'		Boring # Interval: Type
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		N/A
	Borehole # \ Tubing ( ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0718	Travel to 200 East, pick up respiratory protection, Are in
0750	Enter farm, perform camera survey, found broken joint at 237' (approximately)
0902	Evaluated situation, picked up parts and equipment for probe installation
10:00	Lunch
1104	Entered zone, installed multi-level probe and poly-tubing probe was installed to approximately 279' b.g.s., installed 1 gal neat cement to anchor probe, pulled 2½" casing to 217', clean-up
1209	Exit farm, return gear to mask station
1303	Return to shop
	10 joints of 4' 2½" pipe, one box x box 2' joint, tip holder and tip left in ground 237' to 279'
1630	End of shift
	K.O 8-27-19

OPERATOR/LICENSE: Olson #1217 **PERSONNEL:** M. Weakley, C. Catron, O. Amos, A. Hoopes, Z. Nelson	**WEATHER/DOWNTIME:** 92° sunny	**DISCARDED ITEMS:** 10 joints 4' rod 2½" 1-2' Box x Box 1-7 id holder 1 - expendable tip

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	**REVIEWED BY:** RZ Steffler
TITLE: TEAM COGNIZANT PERSON	**TITLE:** ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly O	**SIGNATURE:** R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: 217' pulled	LOCATION: A Tank Farm	DATE: 8-28-19	Report #: ~~262~~ 252
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: AX-063	AHA: EF-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1	HHU CAT #2
SAMPLE# INTERVAL: %	18245144 PAN 18 0125	HHU XL #3	HHU CAT #4

N/A

BOREHOLE SUMMARY END OF SHIFT

Borehole # C-9391 Tubing ( ) @ 217 in 0 ft bgs; S.U. \

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

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

GEOPHYSICAL LOGGING

Boring # Interval: Type

N/A

TIME	WORK SUMMARY
0613	Travel to 200 East, pick up respiratory protection, Ace in
0658	Enter farm, back pull 2½ casing at 30° angle pumping in cement - pumice grout at regular intervals while extracting casing, utilized two drill teams alternating work flow to complete pulling of pipe over multi-level probe
1042	All 2½ casing pulled 216'-0', clean up equipment and exit farm (12 batchs of grout installed)
1100	Lunch
1203	Return to shop, pick up more cement to top-off remainder of bore-hole, pick up protective casing.
1630	End of shift

K.O. 8-28-19

OPERATOR/LICENSE: Olson #1217

PERSONNEL: M. Weakley, O. Amos, A. Hoopes, C. Cotron, J. Ortman, P. Templeton, Z. Nelson

WEATHER/DOWNTIME: 98° sunny

DISCARDED ITEMS:
1 - multi level probe
1 4'x2½ rod
115.2 lbs cement
244.8 lbs pumice
10 gal fuel

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson

TITLE: TEAM COGNIZANT PERSON

SIGNATURE: Kelly Olson

REVIEWED BY: RZ Steffler

TITLE: ATKINS TECHNICAL REVIEWER

SIGNATURE: R.Z. Steffler

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DRILLING AND SAMPLING (PERCUSSION) DAILY WORK RECORD

PURPOSE: A Tank Farm Direct Push Vadose Characterization

SHIFT FOOTAGE: N/A	LOCATION: A Tank Farm	DATE: 8-29-19	Report #: ~~363~~ 253
START CARD NO. RE15990	DECOMMISSION NO. AE49130	RWP: Ax-063	AHA: ET-SH-JHA-005
SAMPLING SUMMERY	U-DIG NO. / EXCAVATION PERMIT NO.	HHU CASE #1 / HHU XL #3	HHU CAT #2 / HHU CAT #4
SAMPLE# INTERVAL: %	18246144 DAN 18 0125		
N/A	BOREHOLE SUMMARY END OF SHIFT	GEOPHYSICAL LOGGING	
	Borehole # C-9391 Tubing (\ ) @ \ to \ ft bgs; S.U. \	Boring # Interval: Type	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \	N/A	
	Borehole # \ Tubing (\ ) @ \ to \ ft bgs; S.U. \		

TIME	WORK SUMMARY
0611	Travel to 200 East
0642	Arrive at 200 East, pre-job
0703	Pre-job concludes, Ace in, pick up respiratory protection, Stand-by for AOP-014 (lightening)
0802	AOP lifted, prep to enter farm
0818	Enter farm, pull retaining 'nails' on angle plate at C-9391, operators topped off cement grout pumice mix with an addiondl five batches. Dig in and install 10"X2' surface protection, Move rig to gate and RCT's survey'ed it out, used prior release from C-A to RBA for main source of release, moved rig to staging area for future transport to shop.
1106	Travel to shop, return equipment and tools.
1630	End of shift
	K.O. 8-29-19

OPERATOR/LICENSE: Olson #1217 PERSONNEL: M. Weakley, C. Cotron, J. Ortman, P. Templeton, Z. Nelson, D. Curtis, E. Pope	WEATHER/DOWNTIME: Cloudy, showers 87°	DISCARDED ITEMS: 48 lbs cement 102 lbs Pumice 1 2' x 10" protective casing 1 sack bent

REFERENCE/CONTRACT INFORMATION: Req. 309256, Contract 65210 Release 8

REPORT BY: Kelly Olson	REVIEWED BY: RZ Steffler
TITLE: TEAM COGNIZANT PERSON	TITLE: ATKINS TECHNICAL REVIEWER
SIGNATURE: Kelly Olson	SIGNATURE: RZ Steffler

APPENDIX C

DIRECT PUSH PHOTOGRAPHS

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Setting an angle plate and driving the base retaining pins.

Driving retaining pin on C9394 angle base plate.

Moving the Hydraulic Hammer Unit (HHUXL) to continue driving additional base retaining pins on C9395.

Beginning to drive on C9387.

Side by side logging and sampling angle plates. C9387 and C9388. C9387 tubing driven to ground surface for inoperable crane removal purposes.

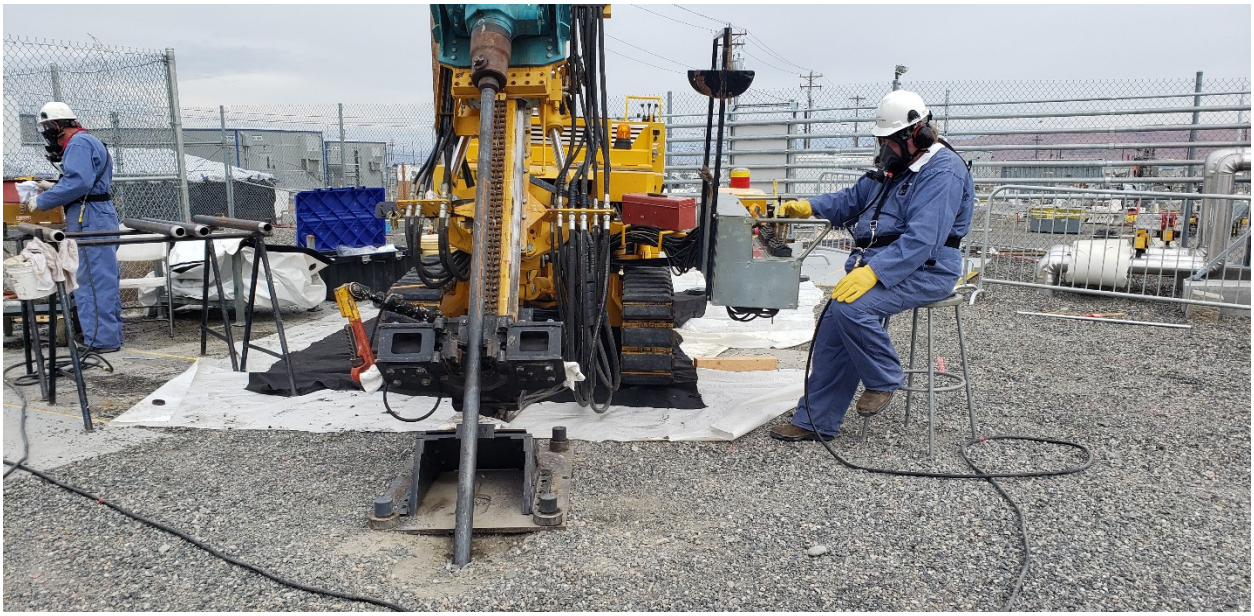
Set up and preparation to start sampling at C9386.

Recovering probe in C9385.

Setting up on C9395, 45° push.

Driving on C9393.

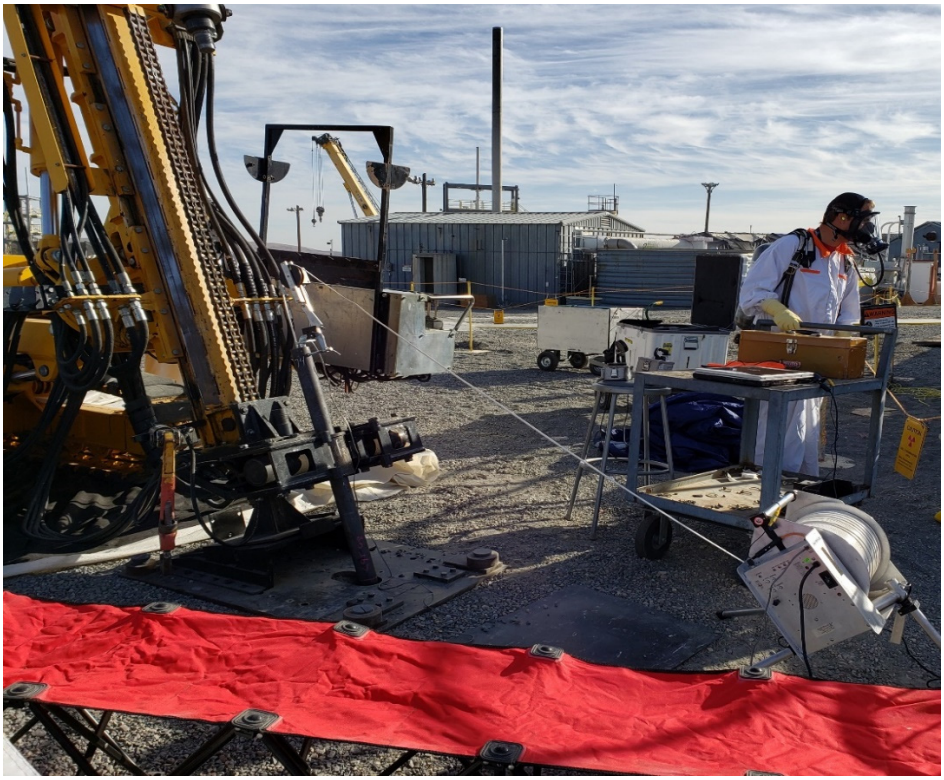
Driving at a 45° angle on C9396.



Driving to depth on C9387.

Total depth achieved on C9393.

Performing a camera survey on C9391.



Performing a camera survey on C9393.

Preparation for a gyroscope survey on C9395.

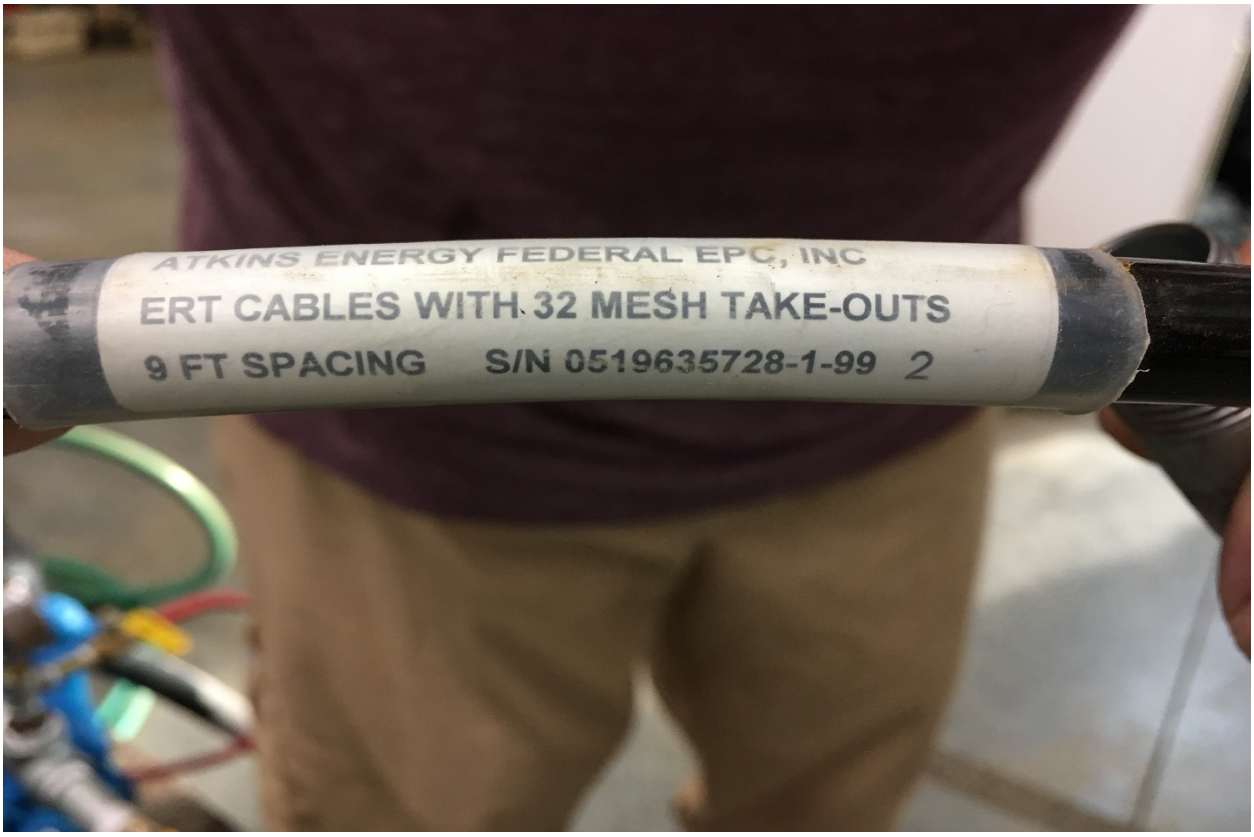
Gyroscope surveying C9385.

Geophysical logging of C9391.

Geophysical logging of C9393. Driving on C9395.

Recovered damaged logging tool from C9385.

Gamma probe retrieval using a spooled duct rod on C9387.

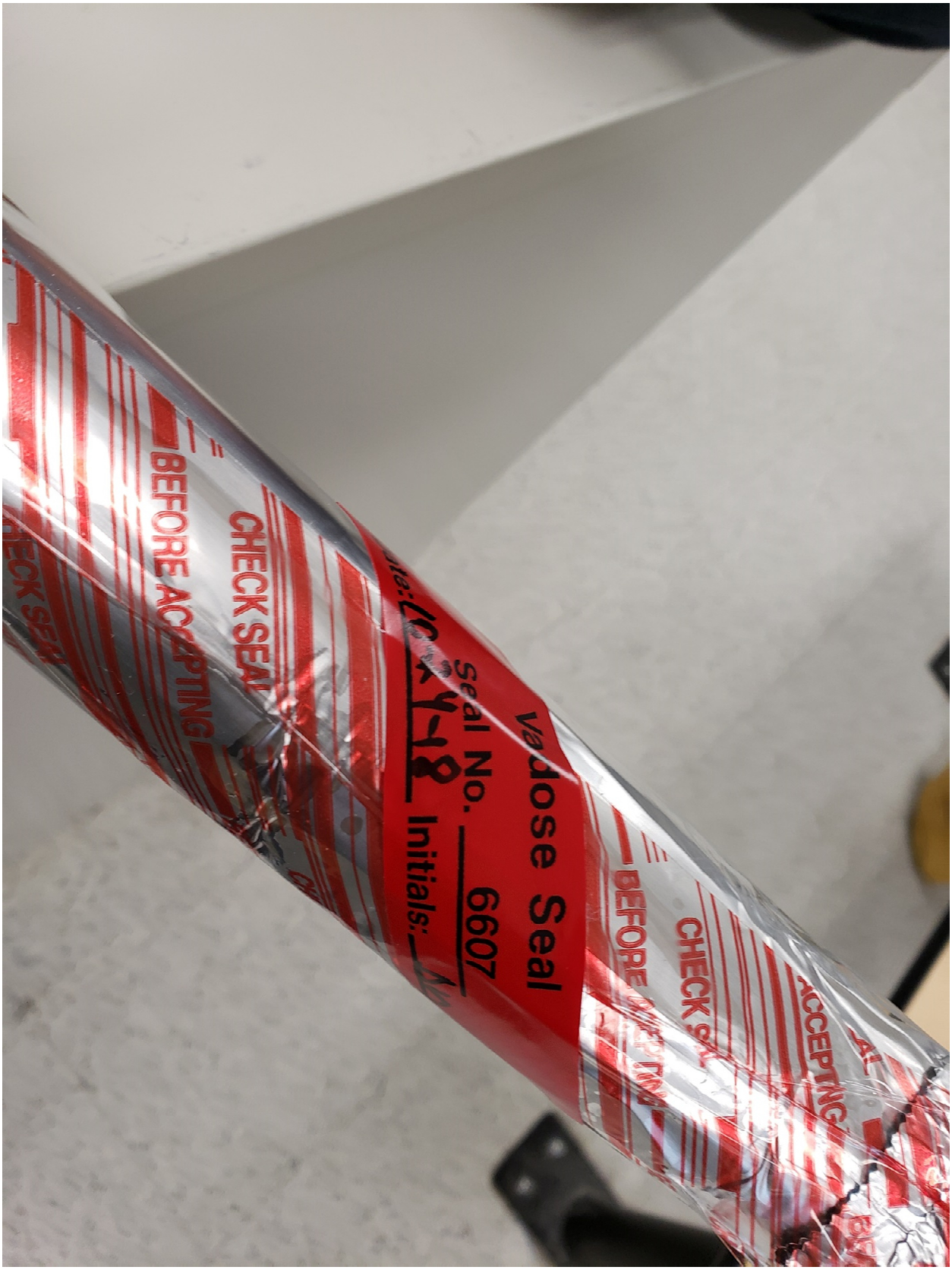


Electrical Resistivity Tomography sensor identifier.

Electrical Resistivity Tomography sensor installation in C9395.

Broken drive tubing C9385.

Broken inner string drive tubing.



Sealed sampler received from 222-S Lab after their cleaning process.

Radiation surveying of inner string during sample retrieval.

Sample obtained from the sampler drive shoe from C9386, 75 to 77 ft.

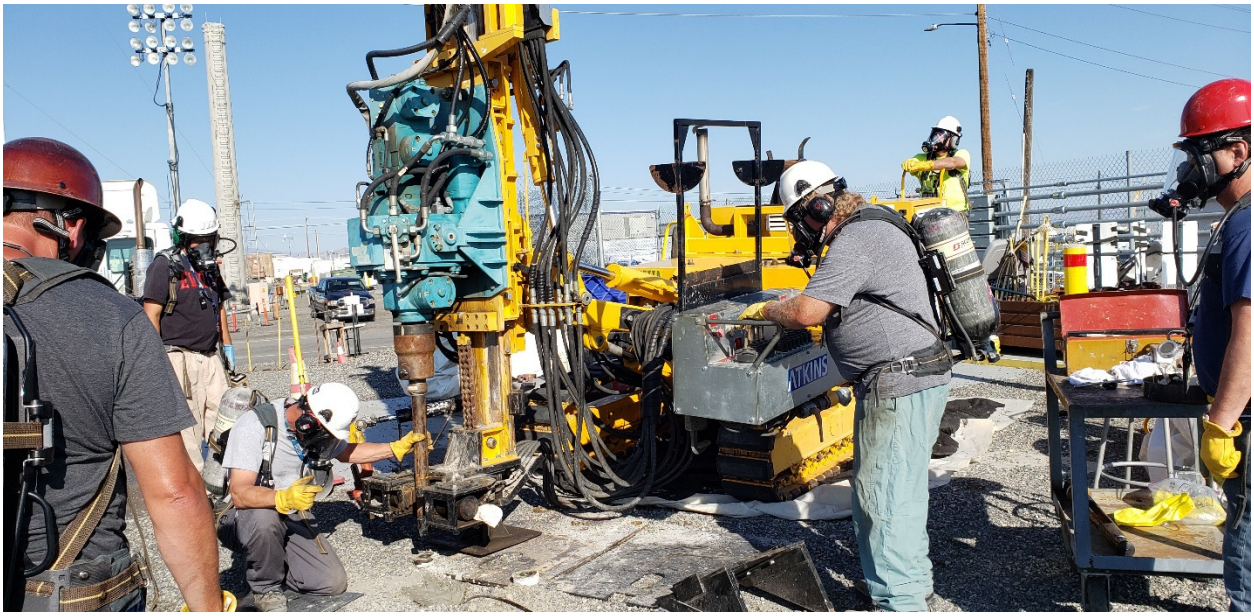
Direct push sample liner with fine-grained, moist material collected at 273 to 277 ft. from C9386.

Quality control field blank water sample obtained for C9386, 75 to 77 ft.

Surface soil sampling at C9386.

Surface soil sampling at C9386.

Tagging depth of bentonite in C9386.



Pulling angle plate base retaining rods on C9387.

Pulling angle plate base retaining rods.

Installation of C9395 Electrical Resistivity Tomography sensor surface protective casing.

C9387 Electrical Resistivity Tomography sensor surface protective casing.

Location of C9387 and C9388 in relation to the crane drive path.

Completed installation of surface protective casing at C9387.

APPENDIX D

CHARACTERIZATION DEVIATION FORMS

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CHARACTERIZATION DEVIATION FORM

KS 7/29/19

Document: RPP-PLAN-62043~~1~~ **Change Number:** A-AX_FA1-001 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 8/7/18

Original Requirement:

1. Table 5-3, *Field Quality Control Requirements for Field Blanks and Equipment Rinsate Blanks for WMA A-AX Focus Area 1 (Deionized Water Samples)* identified the primary method for mercury analysis as "7471 Cold vapor atomic absorption",
2. Table 5-3 identifies the holding time for pesticides by Method 8081 GC/ECD (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, Chlordane, Dieldrin, Endrin, Heptachlor, Heptachlor epoxide, and Hexachlorobenzene) as 14/40 days.
3. Table 5-3 identifies the holding time for PCBs by Method 8082 GC/ECD (Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) as 14/40 days.
4. Table 5-3 identifies the holding time for semi-VOAs by Method 8270 GC/MS (bis(2-Ethylhexl)phthalate and Tributyl phosphate) as 14/40 days.
5. Table 5-3 identifies the container type for pesticides, PCBs, semi-VOAs, and total organic carbon as Glass or Plastic.
6. Table 5-3 identifies the preservation of total organic carbon by Method 9060 as "H_2SO_4 to pH≤2".

Samples Impacted: Liquid quality control field blanks.

Proposed Change:

1. Table 5-3, identify the primary method for mercury analysis as "747~~1~~0 Cold vapor atomic absorption".
2. Table 5-3, identify the holding time for pesticides as ~~14~~7/40 days.
3. Table 5-3, identify the holding time for PCBs as ~~14/40 days~~ "1 year".
4. Table 5-3, identify the holding time for semi-VOAs as ~~14~~7/40 days.
5. Table 5-3 identify the container type for pesticides, PCBs, semi-VOAs, and total organic carbon as amber glass.
6. Table 5-3 identify the preservation of total organic "H_2SO_4 to pH<2".

Reason for Change:

Analytical method for mercury analysis in water and holding times for pesticides, PCBs, and semi-VOAs are incorrect in Table 5-3. Container type for pesticides, PCBs, semi-VOAs, and total organic carbon is incorrect and preservation for total organic carbon should be to a "pH<2". See attached modified Table 5-3.

Date Change Effective: 8/7/18

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L **Date:** 8/8/18

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 8/8/2018

222-S Sample Management Office (Print/Sign): McKinney, Jo M **Date:** 8/13/18

Laboratory Project Coordinator (Print/Sign): Snyder, Susan M **Date:** 8/13/18

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 8/13/18

Table 5-3. Field Quality Control Requirements for Field Blanks and Equipment Rinsate Blanks for WMA A-AX Focus Area 1 (Deionized Water Samples)

Primary Method[a]	Constituent	Container	Preservative	Holding Time
6010 Inductively coupled plasma/atomic emission spectroscopy	Aluminum, Barium, Beryllium, Bismuth, Boron, Calcium, Cerium, Chromium, Copper, Iron, Lanthanum, Lead, Lithium, Magnesium, Manganese, Molybdenum, Neodymium, Phosphorous, Potassium, Rhodium, Silicon, Sodium, Strontium, Sulfur, Tantalum, Thorium, Tin, Tungsten, Zinc, Zirconium	Glass/plastic 500 mL	HNO_3 to pH<2	6 months (28 days for Mercury)
6020 Inductively coupled plasma/mass spectroscopy	Antimony, Arsenic, Cadmium, Cobalt, Nickel, Selenium, Silver, Thallium, Uranium, Vanadium			
Calculation	Uranium[b]			
Inductively coupled plasma/ mass spectroscopy	Neptunium-237, Techenetium-99, Tin-126, Thorium-232, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238			
7470~~1~~ Cold vapor atomic absorption	Mercury			
Ion chromatography EPA 300.7	Ammonium	Glass/plastic 250 mL	H_2SO_4 to pH<2/ Cool to ≤6°C	28 days
9056 Ion chromatography	Bromide, Chloride, Fluoride, Nitrate[c], Nitrite[c], Phosphate, Sulfate, Acetate, Formate, Glycolate, Oxalate	Glass/plastic 500 mL	Cool to ≤6°C	28 days/ 48 hours[d]
7196 Colorimetric	Hexavalent Chromium	Glass/plastic 500 mL	Cool to ≤6°C	24 hours
9014 Spectrophotometric	Cyanide	Glass/plastic 60 mL	NaOH to pH≥12/ Cool to ≤6°C	14 days
9060	Total Organic Carbon	Amber ~~G~~glass 500 mL	H_2SO_4 to pH~~<~~≤2/ Cool to ≤6°C	28 days

Table 5-3. Field Quality Control Requirements for Field Blanks and Equipment Rinsate Blanks for WMA A-AX Focus Area 1 (Deionized Water Samples)

Primary Method[a]	Constituent	Container	Preservative	Holding Time
8081 GC/ECD	4,4′-DDD, 4,4′-DDE, 4,4′-DDT, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, Chlordane, Dieldrin, Endrin, Heptachlor, Heptachlor epoxide, Hexachlorobenzene	Amber ~~G~~glass 2 x 1,000 mL	Cool to ≤6°C C	~~14~~ 7 days/ 40 days[e]
8082 GC/ECD	Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260	Amber ~~G~~glass 2 x 1,000 mL	Cool to ≤6°C	~~14 days/ 40 days~~ 1 year
8270 GC/MS	bis(2-Ethylhexl)phthalate, Tributyl phosphate	Amber ~~G~~glass 2 x 1,000 mL	Cool to ≤6°C	~~14~~ 7 days/ 40 days[e]
Gamma energy analysis	Antimony-125, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226	Glass/plastic 2×1,000 mL	HNO_3 to pH<2	6 months
Alpha energy analysis	Americium-241, Curium-242, Curium-243/244, Plutonium-238, Plutonium-239/240			
Liquid scintillation	Nickel-63, Plutonium-241, Selenium-79			
Beta gas proportional counting	Strontium-90			
Liquid scintillation	Carbon-14, Tritium	Glass/plastic 1,000 mL	None	6 months
Low energy gamma counting	Iodine-129			

Note: The most current version/revision of methods and/or test plans will be used.

[a] Equivalent methods may be used by the laboratory with prior approval by the Data Management Lead.

[b] Uranium result will be calculated using isotopic uranium analysis results.

[c] Analysis for nitrate (CAS number 14797-55-8) and nitrite (CAS number 14797-65-0) will be performed by the laboratory. Nitrogen in nitrate and Nitrogen in nitrite will be determined from nitrate and nitrite results.

[d] 48-hour hold time is for nitrate, nitrite, and phosphate.

[e] Holding time is 14 days from collection to extraction and 40 days from extraction to analysis.

CAS = Chemical Abstracts Service

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Table 5-3. Field Quality Control Requirements for Field Blanks and Equipment Rinsate Blanks for WMA A-AX Focus Area 1 (Deionized Water Samples)

Primary Method[a]	Constituent	Container	Preservative	Holding Time

GC/ECD = gas chromatography/electron capture detector

GC/MS = gas chromatography/mass spectroscopy

References:

EPA 600/S4-86/024, *Development of Standard Methods for the Collection and Analysis of Precipitation*, Method 300.7, "Dissolved Sodium, Ammonium, Potassium, Magnesium, and Calcium in Wet Deposition by Chemically Suppressed Ion Chromatography."

SW-846, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*.

KS 7/29/19

CHARACTERIZATION DEVIATION FORM

Document: RPP-PLAN-62043~~3~~1 **Change Number:** A-AX_FA1-002 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 8/7/18

Original Requirement:

1. Table 5-2, Soil Sampling Requirements for WMA A-AX Focus Area 1, includes footnote "g" after "Bulk (sediment) density".
2. Table 5-2, footnote "i" cites document Interoffice Memorandum WRPS-0900155, Rev. 2, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project."
3. Table 6-1, footnote "q" cites document WRPS-0900155.
4. Table 6-2, page 6-10, and page 12-4 refers to document WRPS-0900155.

Samples Impacted: Surface and subsurface soil samples.

Proposed Change:

1. Table 5-2, remove footnote "g" after "Bulk (sediment) density".
2. Table 5-2, cite document LAB-PLN-18-00004, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project."
3. Table 6-1, footnote "q" cite document LAB-PLN-18-00004.
4. Table 6-2, page 6-10, and page 12-4 refer to document LAB-PLN-18-00004.

Reason for Change:

- In Table 5-2, footnote "g" is not applicable to "Bulk (sediment) density".
- LAB-PLN-18-00004 *supersedes* WRPS-0900155. See attached modified Tables 5-2, 6-1, 6-2, and text on pages 6-10 and 12-4.

Date Change Effective: 8/7/18

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L — **Date:** 8/7/18

Quality Assurance (Print/Sign): Lungu, Cris C — **Date:** 8/7/2018

222-S Sample Management Office (Print/Sign): McKinney, Jo M — **Date:** 8/13/18

Laboratory Project Coordinator (Print/Sign): Snyder, Susan M — **Date:** 8/13/18

Data Management Representative (Print/Sign): Schuyler, Kimberly A — **Date:** 8/13/18

Table 5-2. Soil Sampling Requirements for WMA A-AX Focus Area 1[a]

Analysis Type	Primary Method[b]	Constituent/Physical Properties	Holding Time
	8081 GC/ECD	4,4′-DDD, 4,4′-DDE, 4,4′-DDT, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, Chlordane, Dieldrin, Endrin, Heptachlor, Heptachlor epoxide, Hexachlorobenzene,	14 days/40 days[g]
	8082 GC/ECD	Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, Aroclor-1260	None
Standard	8270 GC/MS	bis(2-Ethylhexl)phthalate, Tributyl phosphate	14 days/40 days[g]
	Gamma energy analysis	Antimony-125, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226	6 months
	Low energy gamma counting	Iodine-129	6 months
	ICP/MS (acid extraction)	Neptunium-237, Technetium-99, Tin-126, Thorium-232, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238	6 months
	Liquid scintillation	Carbon-14, Nickel-63, Plutonium-241, Selenium-79, Tritium	6 months
	Alpha energy analysis	Americium-241, Curium-242, Curium-243/244, Plutonium-238, Plutonium-239/240	6 months
	Beta gas proportional counting	Strontium-90	6 months
	Gravimetric[h]	Percent solids	None
	Gravimetric[h]	Percent water	None
	Gravimetric[i]	Bulk (sediment) density[e]	None
	ASTM D7928 ASTM D6913	Particle size distribution[j]	None

Note: The most current version/revision of methods and/or test plans will be used.

[a] Sampling personnel will place the shoe material in a 500 mL (16 oz) glass jar. The samples will be cooled to ≤6°C (≤43°F).

[b] Equivalent methods may be used by the laboratory with prior approval by the Data Management Lead.

[c] Analysis for nitrate (CAS number 14797-55-8) and nitrite (CAS number 14797-65-0) will be performed by the laboratory. Nitrogen in nitrate and nitrogen in nitrite will be determined from nitrate and nitrite results.

Table 5-2. Soil Sampling Requirements for WMA A-AX Focus Area 1[a]

Analysis Type	Primary Method[b]	Constituent/Physical Properties	Holding Time

[d] Uranium result will be calculated using isotopic uranium analysis results. The holding time listed is applicable to the analysis of samples for isotopic uranium.

[e] 48-hour hold time is for nitrate, nitrite, and phosphate.

[f] Holding time is 7 days from collection to extraction/distillation and 28 days from distillation to analysis of preserved distillate.

[g] Holding time is 14 days from collection to extraction and 40 days from extraction to analysis.

[h] Performed using ASTM D2216 with minor modification of the target temperature to 105°C (221°F) and a 1% criteria for final mass difference (Method A).

[i] Bulk (sediment) density will be measured on only subsurface samples and will be determined as described in LAB-PLN-18-00004~~Interoffice Memorandum WRPS-0900155, Rev. 2~~, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project." Bulk density cannot be determined using ASTM D2937 due to the compaction that occurs using the direct push sampling technique. The reported results using LAB-PLN-18-00004~~WRPS-0900155~~ will not be a true bulk density, but rather, a sediment density measurement.

[j] Particle size distribution will be performed by the laboratory, if sample volume is sufficient.

ASTM = American Society for Testing and Materials
CAS = Chemical Abstracts Service
GC/ECD = gas chromatography/electron capture detector
GC/MS = gas chromatography/mass spectroscopy
ICP/AES = inductively coupled plasma/atomic emission spectroscopy
ICP/MS = inductively coupled plasma/mass spectroscopy

References:

ASTM D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.*

ASTM D2937, *Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.*

ASTM D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.*

ASTM D7928, *Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis.*

EPA 600/S4-86/024, *Development of Standard Methods for the Collection and Analysis of Precipitation,* "Method 300.7, Dissolved Sodium, Ammonium, Potassium, Magnesium, and Calcium in Wet Deposition by Chemically Suppressed Ion Chromatography."

SW-846, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods.*

LAB-PLN-18-00004~~WRPS-0900155, Rev. 2~~, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project."

Table 6-1. Analytical and Quality Control Requirements for WMA A-AX Focus Area 1

Constituent/Physical Properties	Required Detection Limit[a]	Primary Method[b, c] (prep)	Alternative Method[b] (prep)	QC Acceptance Requirements[d,e]			Holding Times
				LCS %Recovery	Spike %Recovery	RPD	

[m] The laboratory shall differentiate between water extraction and acid extraction ^{99}Tc results in both hard copy and electronic (HEIS) reporting. For HEIS upload, the extraction (WE [water] or AE [acid]) will be appended to the method name.

[n] The acceptance requirements listed are those for Tin-117 (^{117}Sn), which is used as a surrogate to estimate precision and accuracy of the method for ^{126}Sn.

[o] RPP-RPT-60227, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area A-AX,* erroneously identified water as the sample preparation method.

[p] Performed using ASTM D2216 with minor modification of the target temperature to 105°C (221°F) and a 1% criteria for final mass difference (Method A).

[q] Bulk (sediment) density will be measured on only subsurface samples and will be determined as described in LAB-PLN-18-00004~~Interoffice Memorandum WRPS-0900155, Rev. 2~~, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project." Bulk density cannot be determined using ASTM D2937 due to the compaction that occurs using the direct push sampling technique. The reported results using LAB-PLN-18-00004~~WRPS 0900155~~ will not be a true bulk density, but rather, a sediment density measurement.

[r] Particle size distribution will be performed by the laboratory, if sample volume is sufficient.

CAS = Chemical Abstracts Service
GC/ECD = gas chromatography/electron capture detector
GC/MS = gas chromatography/mass spectroscopy
ICP/AES = inductively coupled plasma/atomic emission spectroscopy
ICP/MS = inductively coupled plasma/mass spectroscopy
LCS = laboratory control sample
NA = not applicable
RPD = relative percent difference

References:

ASTM D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.*

ASTM D2937, *Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.*

ASTM D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.*

ASTM D7928, *Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis.*

EPA 600/S4-86/024, *Development of Standard Methods for the Collection and Analysis of Precipitation*, "Method 300.7, Dissolved Sodium, Ammonium, Potassium, Magnesium, and Calcium in Wet Deposition by Chemically Suppressed Ion Chromatography."

RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives.*

RPP-RPT-38152, *Data Quality Objectives Report Phase 2 Characterization for Waste Management Area C RCRA Field Investigation/Corrective Measures Study.*

SW-846, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods.*

WHL-MP-1011, *Quality Assurance Project Plan for 222-S Laboratory.*

LAB-PLN-18-00004~~WRPS-0900155 Rev. 2~~, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project."

Table 6-2. Analytical Priorities for WMA A-AX Focus Area 1

Priority	Analysis Type	Primary Method	Constituent/Physical Properties

ASTM = American Society for Testing and Materials
CAS = Chemical Abstracts Service
GC/ECD = gas chromatography/electron capture detector
GC/MS = gas chromatography/mass spectroscopy
ICP/AES = inductively coupled plasma/atomic emission spectroscopy
ICP/MS = inductively coupled plasma/mass spectroscopy

References:

ASTM D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis*.

ASTM D7928, *Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis*.

EPA 600/S4-86/024, *Development of Standard Methods for the Collection and Analysis of Precipitation*, "Method 300.7, Dissolved Sodium, Ammonium, Potassium, Magnesium, and Calcium in Wet Deposition by Chemically Suppressed Ion Chromatography."

SW-846, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*.

LAB-PLN-18-00004~~WRPS-0900155, Rev. 2~~, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project."

For each surface sample and subsurface sample liner, a licensed geologist with Hanford Site experience will photograph, examine, and describe the material from each glass jar and liner. Visual inspection and manual manipulations are performed to provide a geologic description of each sample. These descriptions shall provide estimates of the percentage of sand, fine sand, very fine sand, coarse to fine silt, and mud content per ASTM D2488, Standard Practice for Description and Identification of Soils (Visual–Manual Procedure). The sediment descriptions are recorded and used to classify the sediment texture on a modified Folk/Wentworth diagram. Note that additional HEIS sample numbers will be assigned to the composite and "quick turn" samples, as needed.

Sections 6.1.1 and 6.1.2 describe surface and subsurface sample analysis, respectively. Particle size distribution will be performed per LAB-PLN-18-00004~~WRPS-0900155~~, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project" only if there is enough sample material.

6.1.1 Surface Sample Analysis

Surface samples will be photographed, geologically described, and subsampled per LAB-PLN-18-00004~~WRPS-0900155~~. Percent water and percent solids will also be determined per LAB-PLN-18-00004~~WRPS-0900155~~. Bulk (sediment) density will not be calculated on surface samples. Subsampled material will be used to perform the "quick turn" and standard analysis identified in Table 6-1.

Direction regarding insufficient sample material is provided in Section 6.2. Reporting of laboratory results is described in Section 7.0.

6.1.2 Subsurface Analysis

Subsurface samples are photographed, geologically described, and subsampled per LAB-PLN-18-00004~~WRPS-0900155~~. Percent water, percent solid, and bulk (sediment) density will also be determined per LAB-PLN-18-00004~~WRPS-0900155~~. Bulk (sediment) density is performed on the contents of only full liners. A visual inspection will be performed to determine the liner that contains the highest moisture content. The contents of this liner will be used for the "quick turn" analysis. Percent water and percent solids will be determined for the contents of this liner. The remaining material from this liner, the other liners, and the shoe will be composited, and percent water and percent solids will also be determined from the composited material. Subsampled composited material will be used to perform the standard analysis identified in Table 6-1.

Direction regarding insufficient sample material is provided in Section 6.2. Reporting of laboratory results is described in Section 7.0.

6.2 INSUFFICIENT RECOVERY OF SAMPLE MATERIAL

If the quantity of sample material is insufficient to perform the analyses required in this SAP, the laboratory and/or SMO shall notify the Data Management Lead within one working day to identify the path forward. The typical prioritization of analyses is listed in Table 6-2; however,

SW-846, 2015, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update V*, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Compendium methods https://www.epa.gov/hw-sw846/sw-846-compendium.

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells," *Washington Administrative Code*, Olympia, Washington. http://apps.leg.wa.gov/WAC/default.aspx?cite=173-160.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended. http://leg.wa.gov/CodeReviser/WACArchive/Documents/2018/WAC%20173%20-303%20%20CHAPTER.pdf

WAC 173-340-820, "Model Toxics Control Act – Cleanup," "Sampling and Analysis Plans," as amended. http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-820

WHL-MP-1011, 2017, *Quality Assurance Project Plan for 222-S Laboratory,* Rev. 13-2, Washington River Protection Solutions, Richland, Washington.

LAB-PLN-18-00004~~WRPS-0900155~~, ~~2011~~2018, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as part of the Vadose Zone Project" ~~(Interoffice Memorandum from H.L. Anastos to G.A. Cooke),~~ Rev. ~~2~~0, Washington River Protection Solutions, Richland, Washington, September 1.

CHARACTERIZATION DEVIATION FORM

KS 7/29/19

Document: RPP-PLAN-62043 1 **Change Number:** A-AX_FA1-003 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 8/13/18

Original Requirement:
The document did not specify the need to use a 1:1 water digest preparation method.

Samples Impacted: "Quick turn" surface and subsurface soil samples.

Proposed Change:

- Add footnote "k" to "Quick Turn" in Table 5-2 with corresponding language:

"Quick turn" analyses will be prepared using a 1:1 water digest method. Around 50 g of soil sample is leached using a ratio of one part water to one part soil. The amount of water added to the soil sample is adjusted based on the percent moisture of the soil to maintain the 1:1 ratio of water to soil. The resultant slurries are placed on a shaker table for around an hour, transferred to a centrifuge tube, centrifuged at 4,000 rpm for 30 minutes and filtered. The filtrates are transferred to a sample bottle and analyzed for nitrate by ion chromatography and technetium-99 by ICP/MS. A separate unfiltered aliquot of the digest is analyzed for conductivity and pH.

- Update "Note 3" in Table 6-1 with the following language:

"Quick turn" analyses will be prepared using a 1:1 water digest method. Around 50 g of soil sample is leached using a ratio of one part water to one part soil. The amount of water added to the soil sample is adjusted based on the percent moisture of the soil to maintain the 1:1 ratio of water to soil. The resultant slurries are placed on a shaker table for around an hour, transferred to a centrifuge tube, centrifuged at 4,000 rpm for 30 minutes and filtered. The filtrates are transferred to a sample bottle and analyzed for nitrate by ion chromatography and technetium-99 by ICP/MS. A separate unfiltered aliquot of the digest is analyzed for conductivity and pH.

Reason for Change:
This detail is necessary for "quick turn" sample analysis.

Date Change Effective: 8/13/18

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L **Date:** 8/15/18

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 8/15/2018

222-S Sample Management Office (Print/Sign): McKinney, Jo M **Date:** 8/14/18

Laboratory Project Coordinator (Print/Sign): Snyder, Susan M **Date:** 8/15/18

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 8/13/18

Table 5-2. Soil Sampling Requirements for WMA A-AX Focus Area 1[a]

Analysis Type	Primary Method[b]	Constituent/Physical Properties	Holding Time
"Quick Turn[b]"	ICP/MS (water extraction)	Technetium-99	6 months
	9056 Ion chromatography	Nitrate[c]	48 hours
	9045	pH	24 hours (or as soon as possible) after receipt by laboratory
	9050	Specific Conductance	28 days
Standard	6010 ICP/AES	Aluminum, Barium, Beryllium, Bismuth, Boron, Calcium, Cerium, Chromium, Copper, Iron, Lanthanum, Lead, Lithium, Magnesium, Manganese, Molybdenum, Neodymium, Phosphorous, Potassium, Rhodium, Silicon, Sodium, Strontium, Sulfur, Tantalum, Thorium, Tin, Tungsten, Zinc, Zirconium	6 months
	6020 ICP/MS	Antimony, Arsenic, Cadmium, Cobalt, Nickel, Selenium, Silver, Thallium, Uranium, Vanadium	6 months
	Calculation	Uranium[d]	6 months
	7471 Cold vapor atomic absorption	Mercury	28 days
	7196 Colorimetric	Hexavalent Chromium	30 days
	9056 Ion chromatography	Bromide, Chloride, Fluoride, Nitrate[c], Nitrite[c], Phosphate, Sulfate, Acetate, Formate, Glycolate, Oxalate	28 days/48 hours[e]
	Ion chromatography EPA 300.7	Ammonium	7 days/28 days[f]
	9014 Spectrophotometric	Cyanide	14 days
	9060	Total Organic Carbon	28 days

Table 5-2. Soil Sampling Requirements for WMA A-AX Focus Area 1[a]

Analysis Type	Primary Method[b]	Constituent/Physical Properties	Holding Time

[d] Uranium result will be calculated using isotopic uranium analysis results. The holding time listed is applicable to the analysis of samples for isotopic uranium.

[e] 48-hour hold time is for nitrate, nitrite, and phosphate.

[f] Holding time is 7 days from collection to extraction/distillation and 28 days from distillation to analysis of preserved distillate.

[g] Holding time is 14 days from collection to extraction and 40 days from extraction to analysis.

[h] Performed using ASTM D2216 with minor modification of the target temperature to 105°C (221°F) and a 1% criteria for final mass difference (Method A).

[i] Bulk (sediment) density will be measured on only subsurface samples and will be determined as described in LAB-PLN-18-00004, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project." Bulk density cannot be determined using ASTM D2937 due to the compaction that occurs using the direct push sampling technique. The reported results using LAB-PLN-18-00004 will not be a true bulk density, but rather, a sediment density measurement.

[j] Particle size distribution will be performed by the laboratory, if sample volume is sufficient.

[k] "Quick turn" analyses will be prepared using a 1:1 water digest method. Around 50 g of soil sample is leached using a ratio of one part water to one part soil. The amount of water added to the soil sample is adjusted based on the percent moisture of the soil to maintain the 1:1 ratio of water to soil. The resultant slurries are placed on a shaker table for around an hour, transferred to a centrifuge tube, centrifuged at 4,000 rpm for 30 minutes and filtered. The filtrates are transferred to a sample bottle and analyzed for nitrate by ion chromatography and technetium-99 by ICP/MS. A separate unfiltered aliquot of the digest is analyzed for conductivity and pH.

ASTM = American Society for Testing and Materials
CAS = Chemical Abstracts Service
GC/ECD = gas chromatography/electron capture detector
GC/MS = gas chromatography/mass spectroscopy
ICP/AES = inductively coupled plasma/atomic emission spectroscopy
ICP/MS = inductively coupled plasma/mass spectroscopy

References:

ASTM D2216, *Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.*

ASTM D2937, *Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method.*

ASTM D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.*

ASTM D7928, *Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis.*

EPA 600/S4-86/024, *Development of Standard Methods for the Collection and Analysis of Precipitation,* "Method 300.7, Dissolved Sodium, Ammonium, Potassium, Magnesium, and Calcium in Wet Deposition by Chemically Suppressed Ion Chromatography."

SW-846, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods.*

LAB-PLN-18-00004, "Test Plan for Sample Breakdown and Analysis of Sediment Samples Obtained as Part of the Vadose Zone Project."

Table 6-1. Analytical and Quality Control Requirements for WMA A-AX Focus Area 1

Constituent/Physical Properties	Required Detection Limit[a]	Primary Method[b, c] (prep)	Alternative Method[b] (prep)	QC Acceptance Requirements[d,e]			Holding Times
				LCS %Recovery	Spike %Recovery	RPD	
Strontium-90 – ^{90}Sr	0.18[f]	Beta gas proportional counting (acid)	NA	80-120%	75-125%	≤30%	6 months
Percent water	-	Gravimetric[p]	NA	80-120%	NA	≤30%	None
Percent solids	-	Gravimetric[p]	NA	NA	NA	NA	None
Specific Conductance	-	9050	NA	NA	NA	NA	28 days
Bulk (sediment) density[q]	-	Gravimetric[q]	NA	NA	NA	≤30%	None
Particle size distribution[r]	-	ASTM D7928 ASTM D6913	NA	NA	NA	NA	None

Note 1: All standard analyses are performed on composite samples. The laboratory data report will be provided by the laboratory in Format VI. "Quick turn" analyses (excluding pH and specific conductance) will be provided via e-mail to the Data Management Lead and will also be available in the laboratory data report for loading into Hanford Environmental Information System (HEIS).

Note 2: The most current version/revision of methods and/or test plans will be used.

Note 3: **Bold** constituents are "quick turn" constituents. These constituents are also analyzed as part of the standard analyses. Technetium-99 is listed twice in the table because the preparation method is different for "quick turn" and standard analysis. "Quick turn" analyses will be prepared using a 1:1 water digest method. Around 50 g of soil sample is leached using a ratio of one part water to one part soil. The amount of water added to the soil sample is adjusted based on the percent moisture of the soil to maintain the 1:1 ratio of water to soil. The resultant slurries are placed on a shaker table for around an hour, transferred to a centrifuge tube, centrifuged at 4,000 rpm for 30 minutes and filtered. The filtrates are transferred to a sample bottle and analyzed for nitrate by ion chromatography and technetium-99 by ICP/MS. A separate unfiltered aliquot of the digest is analyzed for conductivity and pH.

Note 4: Detection limits may be lower than achievable. The laboratory shall report results to the lowest achievable detection limit while maintaining quality standards. Detection limits that were not achieved will be documented in the laboratory data report (e.g., narrative).

[a] Detection limits for non-radiological constituents are in mg/kg, and detection limits for radiological constituents are in pCi/g.

[b] Equivalent methods may be used by the laboratory with prior approval by the Data Management Lead.

[c] Sampling personnel will place the shoe material in a 500 mL (16 oz) glass jar. The samples will be cooled to ≤6°C (≤43°F). Directions for sample preparation are provided in Section 6.1.

[d] Laboratory quality acceptance requirements are based on RPP-23403, RPP-RPT-38152, and WHL-MP-1011.

[e] QC failures will be brought to the immediate attention of SMO and the Data Management Lead and will be discussed in the laboratory data report narrative. The associated result(s) qualified appropriately in the laboratory data report.

[f] Detection limit listed is Hanford Site background value. The laboratory shall attempt to achieve a detection limit less than Hanford background.

[g] Uranium result will also be calculated using isotopic uranium analysis results. The QC Acceptance Requirements and holding time listed is applicable to the analysis of samples for isotopic uranium.

[h] Holding time is 7 days from collection to extraction/distillation and 28 days from distillation to analysis of preserved distillate.

Table 6-1. Analytical and Quality Control Requirements for WMA A-AX Focus Area 1

Constituent/Physical Properties	Required Detection Limit[a]	Primary Method[b, c] (prep)	Alternative Method[b] (prep)	QC Acceptance Requirements[d,e]			Holding Times
				LCS %Recovery	Spike %Recovery	RPD	

[i] Analysis for nitrate (CAS number 14797-55-8) and nitrite (CAS number 14797-65-0) will be performed by the laboratory. Nitrogen in nitrate and Nitrogen in nitrite will be determined from nitrate and nitrite results.

[j] In support of the ecological risk assessment, the detection limit identified in the DQO Report has been lowered.

[k] Holding time is 14 days from collection to extraction and 40 days from extraction to analysis.

[l] CAS number 319-84-6 is for alpha-Hexachlorocyclohexane and alpha-BHC. CAS number 319-85-7 is for beta-Hexachlorocyclohexane and beta-BHC (also known as beta-1,2,3,4,5,6-Hexachlorocyclohexane [beta-BHC] in HEIS). CAS number 58-89-9 is for gamma-Hexachlorocyclohexane (Lindane) and gamma-BHC.

CHARACTERIZATION DEVIATION FORM

KS 7/29/19

Document: RPP-PLAN-62043 1 **Change Number:** A-AX_FA1-004 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 10/31/18

Original Requirement:
The document did not require blind technetium-99 sample analysis.

Samples Impacted: None.

Proposed Change:
The proposed change is to add a blind technetium-99 sample with a concentration above the detection limit to evaluate technetium-99 results in the characterization dataset. Technetium-99 will be analyzed using a water digest (analogous to "quick turn" sample results) and an acid digest (analogous to standard sample results). Additional blind samples may be performed at the discretion of the project manager. Results of the blind technetium-99 samples will be included in the laboratory data report.

Reason for Change:
Requested by Ecology to determine reliability of technetium-99 results near the detection limit.

Date Change Effective: 10/31/18

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L **Date:** 10/31/18

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 10/31/18

222-S Sample Management Office (Print/Sign): McKinney, Steve G **Date:** 10/31/18

Laboratory Project Coordinator (Print/Sign): Snyder, Susan M **Date:** 10/31/18

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 10/31/18

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KS 7/29/19

CHARACTERIZATION DEVIATION FORM

Document: RPP-PLAN-62047 1 **Change Number:** A-AX_FA1-005 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 10/29/18

Original Requirement:
Section 5.2.1: "Soil in the top 31 cm (12 in.) will be collected using spatula, scoop, or miniature core samplers and placed in a 500 mL (16 oz) glass jar."

Samples Impacted: Surface samples and duplicate surface sample (as appropriate).

Proposed Change:
"Soil in the top 31 cm (12 in.) will be collected using spatula, scoop, or miniature core samplers and placed in a two 500 mL (16 oz) glass jars."

Reason for Change:
This change was requested by the analytical laboratory. Additional sample material can be used for quality control analyses in addition to standard analyses.

Date Change Effective: 10/29/18

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L — **Date:** 10/29/18

Quality Assurance (Print/Sign): Lungu, Cris C — **Date:** 10/29/18

222-S Sample Management Office (Print/Sign): McKinney, Steve G — **Date:** 10/29/18

Laboratory Project Coordinator (Print/Sign): Snyder, Susan M — **Date:** 10/29/18

Data Management Representative (Print/Sign): Schuyler, Kimberly A — **Date:** 10/29/18

Field Work Supervisor (Print/Sign): Franzen, Rick L — **Date:** 10/29/2018

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KS 7/29/19

CHARACTERIZATION DEVIATION FORM

Document: RPP-PLAN-620431 **Change Number:** A-AX_FA1-006 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 11/26/18

Original Requirement:
Section 5.0: "Each location will be comprised of two pushes, the first for geophysical logging and placement of deep electrodes, and the second for collecting soil samples."

Section 5.2: "Field work in WMA A-AX Focus Area 1 involves placement of one vertical direct push (C9385/C9386) and four angle direct pushes (C9387/C9388, C9391/C9392, C9395/C9396, and C9393/C9394) for geophysical logging, soil sampling, and deep electrode placement."

Samples Impacted: None

Proposed Change:
Not to install deep electrodes at vertical borehole C9385.

Reason for Change:
It would be problematic to install resistivity electrodes in C9385 due to a break in the pipe (casing) at 72 feet below ground surface. Ecology verbally identified that they were not necessary due to the close proximity to C9383, which has resistivity electrodes.

Date Change Effective: 11/26/18

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L **Date:** 11/27/18

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 11/27/2018

Direct Push Contractor (Atkins) (Print/Sign): Gardner, Marty **Date:** 11-27-18

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 11/27/18

KS 7/29/19

CHARACTERIZATION DEVIATION FORM

Document: RPP-PLAN-62043 1 **Change Number:** A-AX_FA1-007 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 4/10/19

Original Requirement:
Section 5.2: "To characterize Focus Area 1, three samples will be collected at shallow depths (ground surface to 4.6 m [15 ft] below ground surface [bgs]), and at least seven samples will be collected at deep depths (>4.6 m [15 ft] bgs to total depth of the direct push), from each of the five sampling locations." and "There are five soil sampling locations associated with this focus area, each having 10 soil sample intervals."

Samples Impacted: Samples from C9396.

Proposed Change: Eliminate one of the seven deep samples (>4.6 m [15 ft] bgs) at C9396.

Reason for Change:
C9396 is the most shallow push location, extending to 139 ft below ground surface (197 ft piperun) and did not encounter the Hanford formation unit 3 or the Cold Creek unit. Few features of interest were noted in the geophysical logging results. A sample depth selection meeting was held on March 19, 2019 and attendees discussed logging results and agreed to collect only six deep samples at C9396. Attendees also agreed that an additional sample may be collected at another location. A copy of the signed meeting notes documenting concurrence of these decisions are included in Attachment A.

Date Change Effective: 3/19/19

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L — **Date:** 4/15/19

Quality Assurance (Print/Sign): Lungu, Cris C — **Date:** 4-23-2019

Field Work Supervisor (Print/Sign): Franzen, Rick L — **Date:** 04-23-2019

Data Management Representative (Print/Sign): Schuyler, Kimberly A — **Date:** 4/15/19

DOE-ORP Project Lead (Print/Sign): Lobos, Rodrigo A — **Date:** NA
Concurrence is documented in meeting notes included in Attachment A

Ecology Lead WMA A-AX DQO (Print/Sign): Barnes, Michael W — **Date:** NA
Concurrence is documented in meeting notes included in Attachment A

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Attachment A

MEETING NOTES

WMA A-AX Focus Area 1 Sample Interval Selection Meeting –C9396

Meeting Date: March 19, 2019

Location: 2440 Stevens Center Boulevard, Room 1600, Richland, WA

ATTENDEES:

Cindy Tabor (WRPS)
Dave Becker (WRPS)
Jan Bovier (DOE-ORP)
Rod Lobos (DOE-ORP)
Mike Barnes(Ecology)
Marysia Skorska (Ecology)
Kim Schuyler (Freestone)

BACKGROUND:
This meeting was part of the continuing effort to ensure communication between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions (WRPS) representatives regarding characterization activities in Waste Management Area A-AX. Specifically RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* states that "geophysical logging data along with any available quick turnaround analysis results ("quick turn") for two mobile contaminants (technetium-99 and nitrate) will be used to aid in determining subsurface sample depths. The subsurface sampling horizons will be selected in an open meeting to which WRPS staff, DOE, Ecology, U.S. Environmental Protection Agency (EPA), and other site contractors shall be invited."

Purpose of Meeting: This meeting was called to provide a brief update on field status, review geophysical logging data results from direct push locations C9395, discuss the sample depth selection process, and agree upon sample depth intervals for C9396.

Discussion: Ecology was provided information on one direct push locations in A Farm (exploratory direct push location C9395). This location had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, and thorium data, and historical information were used to select sample depths. Ecology was also briefed on the status of field work for WMA A-AX Focus Area 1. A map of WMA A-AX was presented and Cindy Tabor identified C9395/C9396 as the location in which sample depths are to be selected. The 241-A-105 Tank is the target of characterization.

Field Work Status:
Ms. Tabor provided a brief summary of field activities. Ms. Tabor identified that a more detailed field status had been previously provided to meeting attendees during the "Waste Management Area A-AX: Briefing on Focus Area 2 and Field Updates on Focus Area 1" meeting held on March 5, 2019.

- All work at location C9385/C9386 is complete.
- Location C9391 is being geophysically logged.
- Location C9393 been logged and Location C9394 was being sampled.
- Location C9395 has been logged.
- Work has not started at C9387/C9388.

Mike Barnes requested draft geophysical logging from C9391 but Ms. Tabor stated that the location was still being logged. She also noted that inclement winter weather had impacted logging schedule.

Sample Selection:

It was noted that the sample depth selection process is slightly different than described in the A-AX DQO (RPP-RPT-60227, Rev. 0, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area A-AX* [DQO]). A set of sample depths identified using a random selection process were available to be selected in lieu of strictly judgmental sample depths. A hard copy plot of C9395 gross gamma and moisture geophysical logging data was presented. The plots show sample depths, judgmental and random depths, overlain on the geophysical data plot. The meeting attendees were given the opportunity to decide if random sample depths, judgmental sample depths, or a combination of both should be selected. Ecology decided against using the randomly-generated sample depths.

C9396

Ms. Tabor noted that sample depths are measured in ft length of piperun as opposed to ft below ground surface. The piperun measurement is the reference point used by the field sampling crew identify sample depth intervals in the field. Figure 1-3 from RPP-PLAN-62041 was displayed on the screen to facilitate the discussion of sample depths with respect to sample depth intervals. Ms. Tabor noted that this is the most shallow push location, extending to 139 ft below ground surface (bgs) (197 ft piperun). This location did not encounter the Hanford formation unit 3 or the Cold Creek Unit.

Per RPP-PLAN-62041, three shallow depths will be collected: surface, 10 to 12 ft of piperun (equivalent to 7 to 9 ft bgs), and 17 to 19 ft of piperun (equivalent to 12 to 14 ft bgs).

Ms. Tabor noted the first sample interval is below a pipeline show on the location map. Marysia Skorska inquired about the use of the pipeline (200-E-143-PL). Ms. Schuyler stated that it supplied waste to the WMA A-AX tanks and this sample depth was not selected due to a suspected leak. The first sample depth selected was **97-99 ft piperun** due to its unusual gamma signature. Ms. Tabor briefly discussed all of the sample depths identified Table 1 of Attachment A. Mr. Barnes inquired about the straightness of the push; Ms. Schuyler stated there was approximately 4 ft of offset at deeper depths. Mr. Barnes indicated that was an acceptable deviation.

Mr. Barnes indicated that the area beneath the southeastern edge of the corner (identified as Area "C" in Figure Figure 1-3 from RPP-PLAN-62041) should absolutely be sampled (**162-164 ft piperun**). This area saw cesium-137 contamination in the laterals after an aggressive sluicing campaign in 1970. It is unknown if the cesium-137 was remobilized from a previous leak or if this represented a new leak from Tank A-105. The attendees discussed adding a new sample depth, 99-101 ft piperun below the 97-99 ft piperun sample due to a lack of other features of interest. The attendees agreed to the sample depth **78-80 ft piperun**.

Mr. Barnes inquired about the temperature profile and notes that the plot is in °F but the data appear to be in °C. Ms. Schuyler took the action to discuss the inconsistency with the logging contractor. Mr. Barned stated that he still expected the temperatures to be higher at this direct push location due to the extreme temperatures seen at the 216-A-106 Tank. In the past, temperature distribution was used as the initial indicator of a leak (before drywells or laterals were logged).

The attendees agree to sample depths **99-101** and **176-178 ft piperun**. Meeting attendees were not interested in sample collected at 66-68 or 192-194 ft piperun. Ms. Skorska was interested in collecting the 105-107 ft piperun sample due to its location below the gross gamma anomaly at ~94 to 104 ft piperun. Mr. Barnes identified that he thought the cesium-137 contamination seen in drywell 10-05-02 was caused by "dragged down" at the time the drywell was installed. Ms. Schuyler pointed out that this would be a good opportunity to verify contamination is not present in the area. The attendees agreed to the **105-107 ft piperun** sample depth. The attendees agreed that it is ok to collect three samples (97-99, 99-101, and 105-107 ft piperun) over a limited spatial range. The attendees discussed and agreed to collect only six deep samples at this location and agreed that and additional sample may be collected at another location.

Rod Lobos inquired about the sampling methodology with the direct push. Ms. Tabor explained sampling is conducted using a dual-string sampling system consisting of inner and outer strings deployed by small-diameter push rods. A sampler is attached to the inner string, returned to the bottom of the outer casing/push tubing, where it is "pushed" through the sample interval. Ms. Tabor also discussed the strategy of using the twin borehole approach: one push to geophysical log, the second push location (for sampling) is adjacent to the logging hole.

Ms. Skorska discussed a tool (beta probe) that was developed for the tank farms, which could quantify radionuclides and potentially reduce analytical testing. Ms. Tabor suggested discussing further in the next Tri-Party Agreement Milestone M-045-56 (Interim Measures) annual meeting.

The list of sample depths were re-read to the meeting attendees and all parties concurred with the list of sample depths identified in Table 1.

Table 1. Sample Depths Selected for C9395/C9396

Sample depth (ft piperun)	Reason	Stratigraphy
78-80	Increased moisture and gamma peak (near transition backfill/H1)	H1
97-99	Gamma peak increased (near area of casing corrosion at drywell 10-05-02, ~64 ft bgs)	
99-101*	Additional characterization in the unusual gamma spike	
105-107	Below area of contamination seen in drywell 10-05-02	
162-164	Below area of contamination seen in laterals, area of increased moisture and total gamma	H2
176-178	Highest moisture peak in apparent fine-grained material	

*This depth was not originally identified in Attachment 1

The following is the information was presented to Ecology during the meeting:

- Handout "Attachment 1"
- Summary of rationale and general notes to support sample depth selection for C9396 (see Tables 1 in Attachment 1).
- Copy of Figure 5-1 ("Direct Push Locations for WMA A-AX Focus Area 1") from RPP-PLAN-62041.
- Draft Spectra Gamma & Moisture Surveys (geophysical logs) in piperun depth for C9395.The logs show the proposed sample depths along with lithologic/stratigraphic unit information.
- One cross sections showing the relative location of the C9395/C9396 borehole path and sample depths with respect to the 241-A-105 Tank.
- Hard copies of Draft field geophysical logging results (gamma, moisture, temperature) from C9395.

Action Items:

- Ms. Schuyler check with the geophysical logging contractor and verify the units on the temperature log profile. Mr. Tabor will provide the answer to meeting attendees via email. [Completed 3/19/19].

Rodrigo Lobos		4/10/19
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Michael Barnes	Michael W Barnes	4-11-19
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

WMA A-AX Focus Area Sample Depth Meeting – C9396
March 19, 2019

Sampling Hole

C9396: Surface and Surface Duplicate, 7-9 ft bgs, and 12-14 ft bgs sample collected.

Data Evaluated to Help Determine Possible Sample Depths:

- Gamma, moisture, and temperature data for C9395 (45° angle push)
- Note: Plots are available in Vertical Depth (ft bgs) and Piperun Depth for C9395 since this is angle push.
- Vertical profile and cross section view of sample depths for C9395 (for depth perspective and relationship to tank)
- Relevant available dry well logging information (10-05-02)
- Sample depth information from C9386 and C9394.

General Notes:

- The basis for standard sampling is described in RPP-RPT-60227, DQO Report WMA A-AX, Rev. 0 (Focus Area 1), which indicates that these samples are to be collected from:
  - Recommending 10 sample depths: 3 sample depths of - surface, 7-9, and 12-14 ft bgs (vertical depths) and 7 deeper samples (intervals recommended are identified in Table 1).
  - Specific information on shallower intervals for the 45° angle of C9396:
    - 7 to 9 ft bgs is equivalent to 10 to 12 ft of piperun
    - 12 to 14 ft bgs is equivalent to 17 to 19 ft of piperun

Table 1: Sample Depth Recommendations for C9395/C9396

Judgmental		Stratigraphy	Random
Recommended Sample Depth (ft piperun)	Reason		Recommended Sample Depth (ft piperun)
NA	NA	Backfill	25-27
			27-29
66-68	Below pipeline		45-47
78-80	Increased moisture and gamma peak (near transition backfill/H1)	H1	81-83
97-99	Gamma peak increased (near area of casing corrosion at drywell 10-05-02, ~64 ft bgs)		117-119
105-107	Below area of contamination seen in drywell 10-05-02		142-144
162-164	Below area of contamination seen in laterals, area of increased moisture* and total gamma	H2	163-165
176-178	Highest moisture peak in apparent fine-grained material		
192-194	Bottom of sampling hole		

Note: The following are the stratigraphic units identified from logging hole C9395 (in ft bgs):
Backfill = 0-52, H1 = 52-104, H2 = 104-124.
NA = not applicable
*Moisture reading approximately 18%.

CHARACTERIZATION DEVIATION FORM

KS 7/29/19

Document: RPP-PLAN-62043~~3~~1 **Change Number:** A-AX_FA1-008 **ECN to TSAP Required? Y / N**

Requestor: K. Schuyler **Date:** 4/11/19

Original Requirement:
During development of the SAP[1], some of the values for direct push target depths, angles, pipe run lengths, and distances from the tank identified in Table 5-1 had been modified from those identified in the DQO Report[2] to accommodate existing infrastructure and planned retrieval program needs.

Section 5.1: "Further modifications may be required after field walk downs are conducted, during work package development, and/or if an obstruction occurs during pushing. Changes in direct push locations will require notification and approval of the Project Manager or designee".

Table 5-1 identified the minimum distance C9387/C9388 is from a tank is 28 ft.

Samples Impacted: None.

Proposed Change:
Move the surface location of direct push location C9387/C9388 approximately 7.3 m (24 ft) south and 0.8 m (2.6 ft) to the east. The closest distance to the tank would be 10.3 ft (only change in Table 5-1). The azimuth would change from 152 to 150 degrees from north. See Figure 1 and Figure 2 for a visual representation of the proposed changes. The location of C9387/C9388 was discussed with Washington State Department of Ecology and the U.S. Department of Energy representatives during a sample depth selection meeting for C9392 conducted on April 11, 2019. A copy of the signed meeting notes are included in Attachment A.

Reason for Change:
Surface obstructions and tank waste retrieval operations.

Date Change Effective: 4/11/19

Schedule Impact: None

Authorization:
Project Manager (Print/Sign): Tabor, Cindy L **Date:** 4/15/19

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 5/14/2019

KS 7/29/19

[1] RPP-PLAN-62043~~3~~1, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)*
[2] RPP-RPT-60227, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area A-AX*

Data Management Representative (Print/Sign): Schuyler, Kimberly A Kim Schuyler	**Date:** 4/15/19
DOE-ORP Project Lead (Print/Sign): Lobos, Rodrigo A Concurrence is documented in meeting notes included in Attachment A	**Date:** NA
Ecology Lead WMA A-AX DQO (Print/Sign): Barnes, Michael W Concurrence is documented in meeting notes included in Attachment A	**Date:** NA

Figure 1. Map View of Changes to C9387/C9388 Location

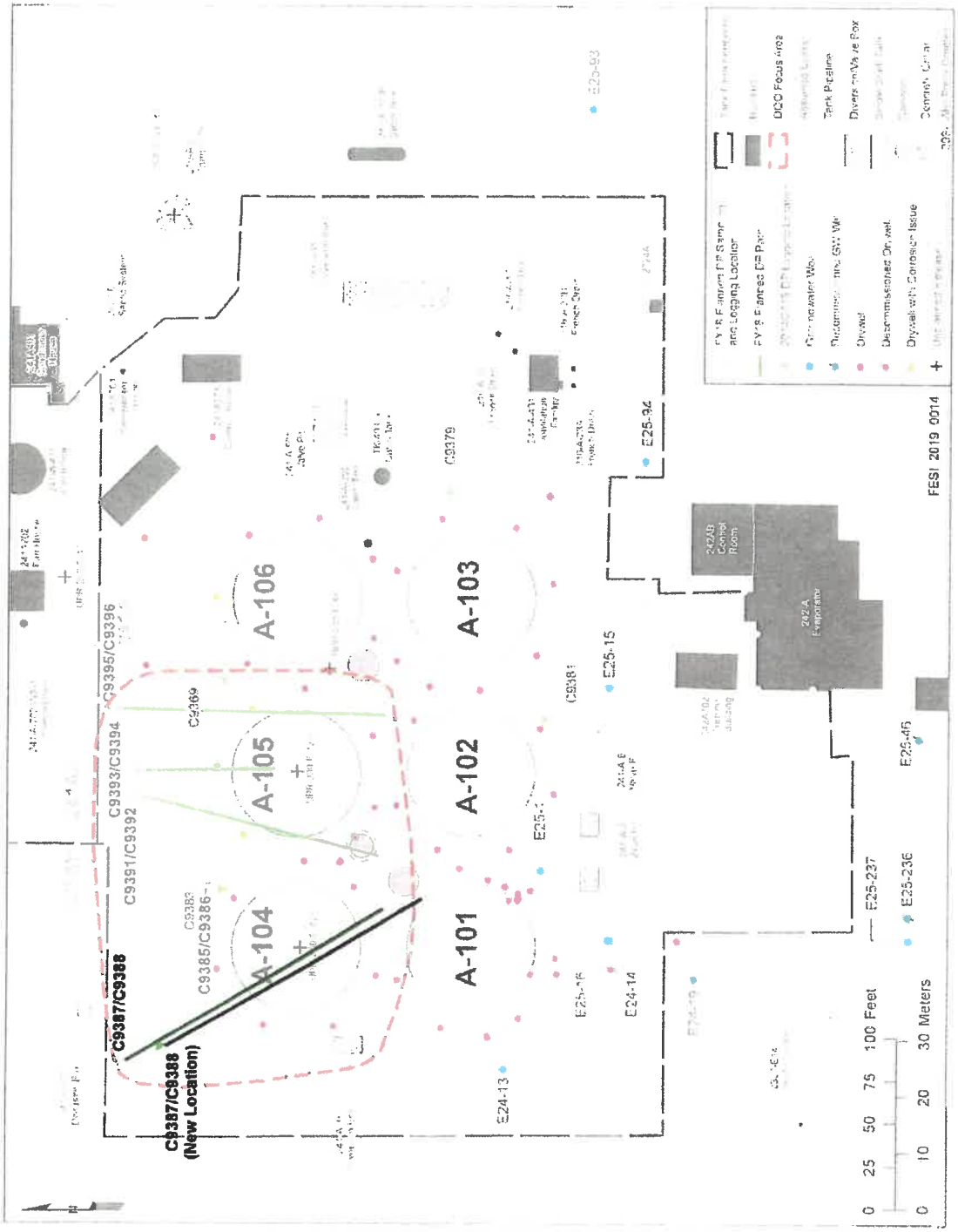
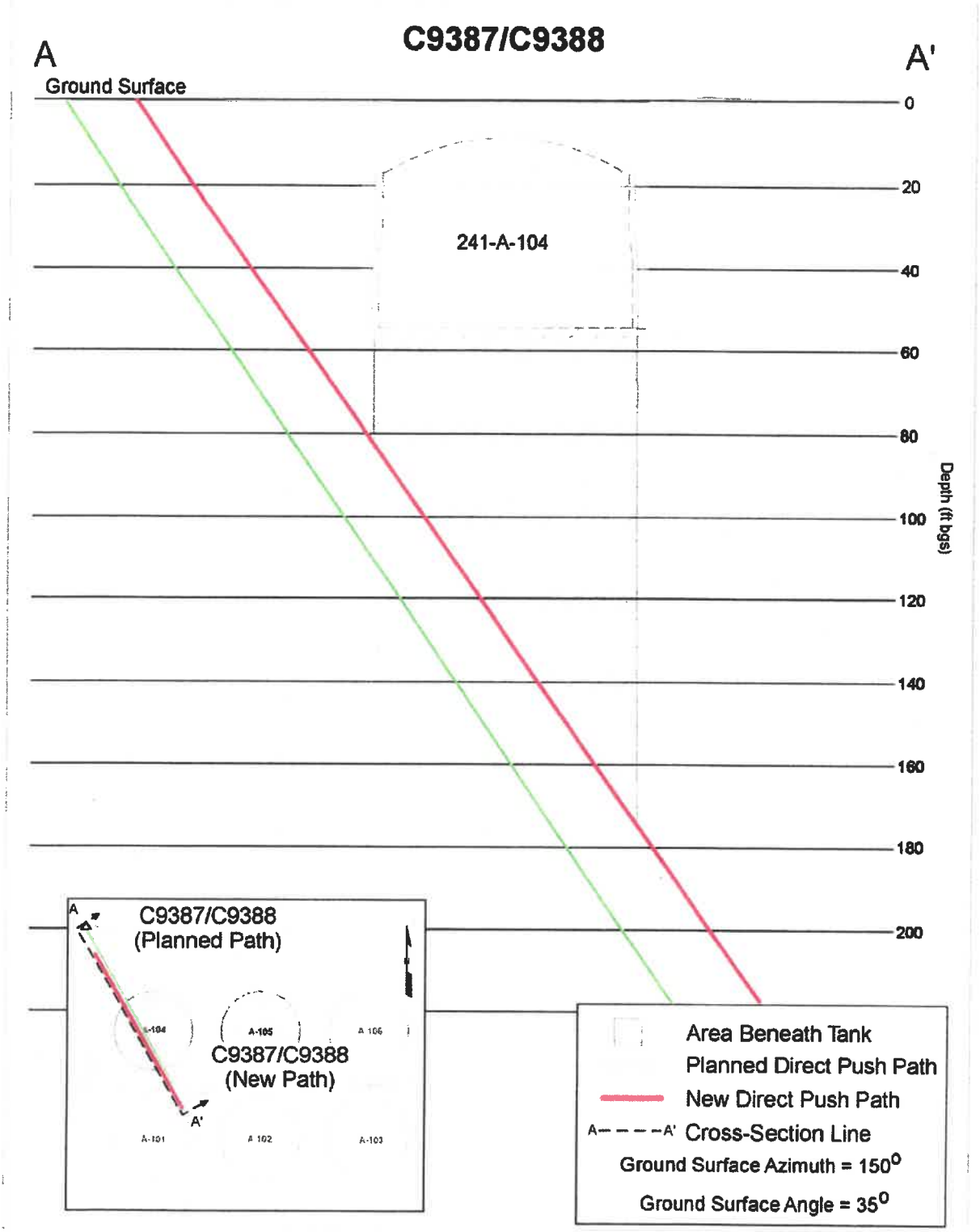


Figure 2. Profile View of Changes to C9387/C9388 Location



Attachment A

WMA A-AX Focus Area 1 Sample Depth Meeting #3

~~DRAFT~~
KS 5/10/19

MEETING NOTES

WMA A-AX Focus Area 1 Sample Interval Selection Meeting – C9392

Meeting Date: April 11, 2019

Location: 2440 Stevens Center Boulevard, Room 1600, Richland, WA

ATTENDEES:

Cindy Tabor (WRPS)
Dave Becker (WRPS)
Rod Lobos (DOE-ORP)
Mike Barnes (Ecology)
Kim Schuyler (Freestone)

BACKGROUND:
This meeting was part of the continuing effort to ensure communication between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions (WRPS) representatives regarding characterization activities in Waste Management Area A-AX. Specifically RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* states that "geophysical logging data along with any available quick turnaround analysis results ("quick turn") for two mobile contaminants (technetium-99 and nitrate) will be used to aid in determining subsurface sample depths. The subsurface sampling horizons will be selected in an open meeting to which WRPS staff, DOE-ORP, Ecology, U.S. Environmental Protection Agency (EPA), and other site contractors shall be invited."

Purpose of Meeting: This meeting was called to review geophysical logging data results from direct push location C9391, discuss the sample depth selection process, and agree upon sample depth intervals for C9392. It was also used to document the slight movement in the C9387/C9388 location.

Discussion: Ecology was provided information on one direct push location in A Farm (exploratory direct push location C9391). This location had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, and thorium data, and historical information were used to select sample depths. A map of WMA A-AX was presented and Ms.Tabor identified C9391/C9392 as the location in which sample depths were to be selected. Tank 241-A-105 is the target of characterization for this location.

Sample Selection at C9392 location:
A hard copy plot of C9391 gross gamma and moisture geophysical logging data was presented. Sample depths were overlain on the geophysical data plot. Ms. Tabor noted that sample depths are measured in ft length of piperun as opposed to ft below ground surface. The piperun measurement is the reference point used by the field sampling crew identify sample depth intervals in the field. A map view depicting the actual direct push paths of C9391, C9393, and C9395 was shown to provide a brief update on field progress. To facilitate sample depth selection, the map also showed the approximate extent of contamination, maximum temperature and depth seen at four of the direct push locations, and the apparent surface location of proposed samples at C9392. Ms. Tabor provided a graphic depicting historical gamma logging results for the corroded drywell 10-05-10 (299-E25-66). The cause of casing

corrosion at this drywell is of interest to the meeting attendees. Location C9391 extended to 225 ft below ground surface (bgs) (279 ft piperun). This location did not encounter the Hanford formation unit 3 or the Cold Creek unit.

Per RPP-PLAN-62041, three shallow depths will be collected: surface, 8 to 10 ft of piperun (equivalent to 7 to 9 ft bgs), and 14 to 16 ft of piperun (equivalent to 12 to 14 ft bgs).

Mr. Barnes inquired if any unique signatures (energy levels) were noted by the geophysical logging contractor. Ms. Tabor explained that input from Dr. Randall (geophysical logging contractor) has been requested on this issue. Field plots depicting total gamma and percent moisture and a temperature plot for C9391 were shown. Mr. Barnes noted that if the temperature profile were only from decay in the vadose zone soils, the expected temperature would be approximately 50 °C. He identified that the temperature plot for location C9391 may include decay from waste contained in Tank 241-A-105.

The sample depths and rationale identified in Table 1 of Attachment 1 were discussed. It was noted that backfill is present until approximately 41 ft piperun, Hanford formation unit 1 is present from 41 to 113 ft piperun, and Hanford formation unit 2 is present from 113 to 279 ft piperun. Mr. Barnes inquired about the distance from the maximum temperature seen at location C9391 to the base of Tank 241-A-105. Ms. Schuyler stated it was approximately 15 to 18 ft and corresponds to the sample depth identified at 60 to 62 ft piperun. The meeting attendees agree to the sample interval of **60 to 62 ft piperun**. An additional sample depth interval (54 to 56 ft piperun) was discussed due to an increase in total gamma and moisture data and relative distance to the base of the tank (approximately 25 ft). The attendees agree to add the **54 to 56 ft piperun** sample interval to the list. Mr. Barnes indicated that results from these two sample intervals (54 to 56 ft piperun and 60 to 62 ft piperun) might help determine if there were multiple leaks in the side of the tank. He stated that with multiple leak sites and 50 years of heat from the sludge that the concrete is probably shattered, making retrieval problematic. The meeting attendees also agree to sample depths **113 to 115 ft piperun, 158 to 160 ft piperun, and 190 to 192 ft piperun.**

An unusual gamma and moisture signature is present from 254 ft piperun and continues to the total depth of 279 ft piperun. The signature indicates a facies change that is not evident in the other WMA A-AX Focus Area 1 locations. The meeting attendees agreed to the collection of the last three sample intervals on Table 1 of Attachment 1: **254 to 256 ft piperun, 262 to 264 ft piperun, and 266 to 268 ft piperun.** The total number of selected sample depth intervals is eight rather than seven. It was identified that during the C9396 sample depth meeting on 3/19/2019, there was agreement that one of the seven deep samples would not be collected at this location. It was also identified in that meeting that an additional deep sample depth may be collected from a different direct push location. It was decided that the additional sample interval would be collected at C9392.

The list of sample depths were re-read to the meeting attendees and all parties concurred with the list of sample depths identified in Table 1 (below).

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Table 1. Sample Depths Selected for C9391/C9392

Sample depth (ft piperun)	Reason	Stratigraphy
54-56*	Elevated total gamma and moisture peak in H1 above base of tank, near highest temperature	H1
60-62	Elevated total gamma and moisture peak in H1 near base of tank and highest temperature	
113-115	H1/H2 contact, increased moisture and total gamma underneath drywell, possible leak area	H2
158-160	Elevated total gamma (from 158 ft to 204 ft piperun), area of increased moisture before decrease in moisture, underneath lateral, possible leak area.	
190-192	Targeting maximum total gamma in push, underneath lateral, possible leak area.	
254-256	High moisture with increased total gamma at deeper depth, higher conductivity area.	
262-264	Low moisture with increased total gamma at deeper depth, higher conductivity area.	
266-268	Increase in gamma and moisture, higher conductivity area.	

*This depth was not originally identified in Attachment 1

Review Available Quick Turn Results:

Preliminary quick turn results from three depths at C9396, ten depths at C9394, and ten depths at C9386 were discussed. Mr. Barnes commented on the elevated pH measurements at C9394 and indicated that the pH would have been higher, if the contamination was from the tank. He indicated that he suspected there could be another source of contamination. He requested a diagram of the pipes near Tank 241-A-105. **Action: Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes.**

It was noted that only one depth at one location had a detect of technetium-99. Mr. Barnes was not surprised about the technetium-99 result because the levels were low in the liquid tank waste; most of the technetium-99 is in the salt cake. He indicated that pH is a better tracer of tank leaks because the salts would not migrate through the vadose zone but the mobile contaminants could. It was recommended that samples be collected near pipelines, look for pH measurements above 10 to show the source of contamination is the tank. He also stated elevated levels of sodium and nitrate would indicate a tank leak, and this conclusion is discussed in a PNNL report (UPR 200-E-86 and UPR 200-E-86 investigation at WMA C).

New Surface Location and Direct Push Path for C9387/C9388:

The surface location of C9387/C9388 was moved approximately 24 ft south and 2.6 ft to the east. The azimuth would change from 152 to 150 degrees from north and the closest distance to the tank would be 10.3 ft. Ms. Tabor identified that the distance from the tank was originally 28 ft in the sampling plan and this only thing that changed in Table 5-1 (i.e., target depth, piperun, and angle of the push did not change). Ms. Tabor provided a map view and cross sectional view of the change in

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the direct push path. Ms. Tabor explained that due to tank farm activities and subsurface obstructions, no other location would meet the objectives of the DQO at C9387/C9388. The meeting attendees agreed that the new location is acceptable.

Mr. Barnes inquired about the possibility of placing subsurface electrodes at this location. The interest was due to concern that the concrete base of Tank 241-A-104 may be shattered. The electrodes may provide data to support this conclusion. Ms. Tabor stated that electrodes would be installed at this location.

The following is the information was presented to Ecology during the meeting:

- Handout "Attachment 1"
- Summary of rationale and general notes to support sample depth selection for C9392 (see Tables 1 in Attachment 1).
- A draft map depicting the actual direct push paths of C9391, C9393, and C9395. The map also showed the approximate extent of contamination, maximum temperature and depth seen at four of the direct push locations, and the apparent surface location of proposed samples at C9392.
- Draft Spectra Gamma & Moisture Surveys (geophysical logs) in ft piperun depth for C9391. The logs show the proposed sample depths along with lithologic/stratigraphic unit information.
- A draft cross section showing the relative location of the C9391/C9392 borehole path and sample depths with respect to the Tank 241-A-105.
- Hard copies of draft field geophysical logging results (gamma, moisture, temperature) from C9391.
- A draft map and cross section view comparing the original and new location and path for C9387/C9388.
- Table of available preliminary quick turn results from C9396, C9394, and C9386.

Action Items:

Action: Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes.

Rodrigo Cabos		5-8-2019
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Michael W. Barnes	Michael W Barnes	5-6-2019
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

WMA A-AX Focus Area Sample Depth Meeting – C9392
April 11, 2019

Sampling Hole

C9392: Surface, 7-9 ft bgs, and 12-14 ft bgs sample collected.

Data Evaluated to Help Determine Possible Sample Depths:

- Gamma, moisture, and temperature data for C9391 (30° angle push)
  Note: Plots are available in Vertical Depth (ft bgs) and Piperun Depth for C9392 since this is angle push.
- Vertical profile and cross section view of sample depths for C9392 (for depth perspective and relationship to tank)
- Relevant available dry well logging information (10-05-10 – corrosion at 64 ft bgs and Cs-137 from 76 to 86 ft)
- Sample depth information from C9386, C9394, and C9396.
- Logs from C9385, C9393, and C9395.

General Notes:

- The basis for standard sampling is described in RPP-RPT-60227, DQO Report WMA A-AX, Rev. 0 (Focus Area 1), which indicates that these samples are to be collected from:
  - Recommending 10 sample depths: 3 sample depths of - surface, 7-9, and 12-14 ft bgs (vertical depths) and 7 deeper samples (intervals recommended are identified in Table 1).
  - Specific information on shallower intervals for the 30° angle of C9392:
    1. 7 to 9 ft bgs is equivalent to 8 to 10 ft of piperun
    2. 12 to 14 ft bgs is equivalent to 14 to 16 ft of piperun

Table 1: Sample Depth Recommendations for C9391/C9392

Judgmental		Stratigraphy
Recommended Sample Depth (ft piperun)	**Reason**	
60-62	Elevated total gamma and moisture peak in H1 Near Base of Tank and Highest Temperature	H1
113-115	H1/H2 contact, increased moisture and total gamma Underneath Drywell Possible Leak Area	H2
158-160	Elevated total gamma (from 158 ft to 204 ft), area of increased moisture before decrease in moisture. Underneath Lateral Possible Leak Area	
190-192	Targeting maximum total gamma in push Underneath Lateral Possible Leak Area	
254-256	High moisture with increased total gamma at deeper depth Higher conductivity area.	
262-264	Low moisture with increased total gamma at deeper depth. Higher conductivity area.	
266-268	Increase in gamma and moisture. Higher conductivity area.	

Note: Stratigraphy is presented in ft of piperun.
Backfill = 0-~41 (based on additional information from C9393, H1 = 41-113, H2 = 113-279).

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CHARACTERIZATION DEVIATION FORM

Document: RPP-PLAN-62043-1 **Change Number:** A-AX_FA1-009 **ECN to TSAP Required? Y / N**

Requestor: K. Schuyler **Date:** 4/3/19

Original Requirement:
Section 6.1.2: "A visual inspection will be performed to determine the liner that contains the highest moisture content. The contents of this liner will be used for the "quick turn" analysis."

Samples Impacted: Quick turn sample collected from C9396 interval 78-80 ft piperun.

Proposed Change: Perform quick turn analysis on soil collected in the shoe from C9396 at 78-80 ft piperun rather than a liner. Bulk density will not be measured for this quick turn sample, as it is not performed on anything but full liners (SAP[1] Section 6.1.2).

Reason for Change:
A visual inspection determined the soil collected in the shoe contained the highest moisture content.

Date Change Effective: 4/3/19

Schedule Impact: None.

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L — **Date:** 4/15/19

Quality Assurance (Print/Sign): Lungu, Cris C — **Date:** 4-23-2019

Field Work Supervisor (Print/Sign): McKinney, Steve G — **Date:** 4/23/19

Data Management Representative (Print/Sign): Schuyler, Kimberly A — **Date:** 4/15/19

KS 7/29/19

[1] RPP-PLAN-62043-1, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)*

CHARACTERIZATION DEVIATION FORM

KS 7/29/19

Document: RPP-PLAN-620431 **Change Number:** A-AX_FA1-010 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 4/11/19

Original Requirement:
Section 5.2: "There are five soil sampling locations associated with this focus area, each having 10 soil sample intervals."

Samples Impacted: Samples from C9392.

Proposed Change: Collect one additional deep sample (>4.6 m [15 ft] bgs) at C9392.

Reason for Change:
One less deep sample (only six deep samples) was recommended for collection at C9396 (refer to A-AX-FA1-007). Attendees at sample depth meeting agreed that an additional sample may be collected at another location (refer to meeting notes in A-AX-FA1-007). Based on the C9391 geophysical log, an additional deep sample was recommended for collection at C9392. A copy of these signed meeting notes documenting concurrence is included in Attachment A.

Date Change Effective: 4/11/19

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L **Date:** 4/15/19

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 5/14/2019

Field Work Supervisor (Print/Sign): Franzen, Rick L **Date:** 05/14/2019

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 4/15/19

DOE-ORP Project Lead (Print/Sign): Lobos, Rodrigo A **Date:** NA
Concurrence is documented in meeting notes included in Attachment A

Ecology Lead WMA A-AX DQO (Print/Sign): Barnes, Michael W **Date:** NA
Concurrence is documented in meeting notes included in Attachment A

Page 1 of 1

Attachment A

WMA A-AX Focus Area 1 Sample Depth Meeting #3

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KS 5/10/19

MEETING NOTES

WMA A-AX Focus Area 1 Sample Interval Selection Meeting – C9392

Meeting Date: April 11, 2019

Location: 2440 Stevens Center Boulevard, Room 1600, Richland, WA

ATTENDEES:

Cindy Tabor (WRPS)
Dave Becker (WRPS)
Rod Lobos (DOE-ORP)
Mike Barnes (Ecology)
Kim Schuyler (Freestone)

BACKGROUND:
This meeting was part of the continuing effort to ensure communication between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions (WRPS) representatives regarding characterization activities in Waste Management Area A-AX. Specifically RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* states that "geophysical logging data along with any available quick turnaround analysis results ("quick turn") for two mobile contaminants (technetium-99 and nitrate) will be used to aid in determining subsurface sample depths. The subsurface sampling horizons will be selected in an open meeting to which WRPS staff, DOE-ORP, Ecology, U.S. Environmental Protection Agency (EPA), and other site contractors shall be invited."

Purpose of Meeting: This meeting was called to review geophysical logging data results from direct push location C9391, discuss the sample depth selection process, and agree upon sample depth intervals for C9392. It was also used to document the slight movement in the C9387/C9388 location.

Discussion: Ecology was provided information on one direct push location in A Farm (exploratory direct push location C9391). This location had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, and thorium data, and historical information were used to select sample depths. A map of WMA A-AX was presented and Ms.Tabor identified C9391/C9392 as the location in which sample depths were to be selected. Tank 241-A-105 is the target of characterization for this location.

Sample Selection at C9392 location:
A hard copy plot of C9391 gross gamma and moisture geophysical logging data was presented. Sample depths were overlain on the geophysical data plot. Ms. Tabor noted that sample depths are measured in ft length of piperun as opposed to ft below ground surface. The piperun measurement is the reference point used by the field sampling crew identify sample depth intervals in the field. A map view depicting the actual direct push paths of C9391, C9393, and C9395 was shown to provide a brief update on field progress. To facilitate sample depth selection, the map also showed the approximate extent of contamination, maximum temperature and depth seen at four of the direct push locations, and the apparent surface location of proposed samples at C9392. Ms. Tabor provided a graphic depicting historical gamma logging results for the corroded drywell 10-05-10 (299-E25-66). The cause of casing

corrosion at this drywell is of interest to the meeting attendees. Location C9391 extended to 225 ft below ground surface (bgs) (279 ft piperun). This location did not encounter the Hanford formation unit 3 or the Cold Creek unit.

Per RPP-PLAN-62041, three shallow depths will be collected: surface, 8 to 10 ft of piperun (equivalent to 7 to 9 ft bgs), and 14 to 16 ft of piperun (equivalent to 12 to 14 ft bgs).

Mr. Barnes inquired if any unique signatures (energy levels) were noted by the geophysical logging contractor. Ms. Tabor explained that input from Dr. Randall (geophysical logging contractor) has been requested on this issue. Field plots depicting total gamma and percent moisture and a temperature plot for C9391 were shown. Mr. Barnes noted that if the temperature profile were only from decay in the vadose zone soils, the expected temperature would be approximately 50 °C. He identified that the temperature plot for location C9391 may include decay from waste contained in Tank 241-A-105.

The sample depths and rationale identified in Table 1 of Attachment 1 were discussed. It was noted that backfill is present until approximately 41 ft piperun, Hanford formation unit 1 is present from 41 to 113 ft piperun, and Hanford formation unit 2 is present from 113 to 279 ft piperun. Mr. Barnes inquired about the distance from the maximum temperature seen at location C9391 to the base of Tank 241-A-105. Ms. Schuyler stated it was approximately 15 to 18 ft and corresponds to the sample depth identified at 60 to 62 ft piperun. The meeting attendees agree to the sample interval of **60 to 62 ft piperun**. An additional sample depth interval (54 to 56 ft piperun) was discussed due to an increase in total gamma and moisture data and relative distance to the base of the tank (approximately 25 ft). The attendees agree to add the **54 to 56 ft piperun** sample interval to the list. Mr. Barnes indicated that results from these two sample intervals (54 to 56 ft piperun and 60 to 62 ft piperun) might help determine if there were multiple leaks in the side of the tank. He stated that with multiple leak sites and 50 years of heat from the sludge that the concrete is probably shattered, making retrieval problematic. The meeting attendees also agree to sample depths **113 to 115 ft piperun, 158 to 160 ft piperun, and 190 to 192 ft piperun**.

An unusual gamma and moisture signature is present from 254 ft piperun and continues to the total depth of 279 ft piperun. The signature indicates a facies change that is not evident in the other WMA A-AX Focus Area 1 locations. The meeting attendees agreed to the collection of the last three sample intervals on Table 1 of Attachment 1: **254 to 256 ft piperun, 262 to 264 ft piperun, and 266 to 268 ft piperun.** The total number of selected sample depth intervals is eight rather than seven. It was identified that during the C9396 sample depth meeting on 3/19/2019, there was agreement that one of the seven deep samples would not be collected at this location. It was also identified in that meeting that an additional deep sample depth may be collected from a different direct push location. It was decided that the additional sample interval would be collected at C9392.

The list of sample depths were re-read to the meeting attendees and all parties concurred with the list of sample depths identified in Table 1 (below).

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Table 1. Sample Depths Selected for C9391/C9392

Sample depth (ft piperun)	Reason	Stratigraphy
54-56*	Elevated total gamma and moisture peak in H1 above base of tank, near highest temperature	H1
60-62	Elevated total gamma and moisture peak in H1 near base of tank and highest temperature	
113-115	H1/H2 contact, increased moisture and total gamma underneath drywell, possible leak area	H2
158-160	Elevated total gamma (from 158 ft to 204 ft piperun), area of increased moisture before decrease in moisture, underneath lateral, possible leak area.	
190-192	Targeting maximum total gamma in push, underneath lateral, possible leak area.	
254-256	High moisture with increased total gamma at deeper depth, higher conductivity area.	
262-264	Low moisture with increased total gamma at deeper depth, higher conductivity area.	
266-268	Increase in gamma and moisture, higher conductivity area.	

*This depth was not originally identified in Attachment 1

Review Available Quick Turn Results:

Preliminary quick turn results from three depths at C9396, ten depths at C9394, and ten depths at C9386 were discussed. Mr. Barnes commented on the elevated pH measurements at C9394 and indicated that the pH would have been higher, if the contamination was from the tank. He indicated that he suspected there could be another source of contamination. He requested a diagram of the pipes near Tank 241-A-105. **Action: Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes.**

It was noted that only one depth at one location had a detect of technetium-99. Mr. Barnes was not surprised about the technetium-99 result because the levels were low in the liquid tank waste; most of the technetium-99 is in the salt cake. He indicated that pH is a better tracer of tank leaks because the salts would not migrate through the vadose zone but the mobile contaminants could. It was recommended that samples be collected near pipelines, look for pH measurements above 10 to show the source of contamination is the tank. He also stated elevated levels of sodium and nitrate would indicate a tank leak, and this conclusion is discussed in a PNNL report (UPR 200-E-86 and UPR 200-E-86 investigation at WMA C).

New Surface Location and Direct Push Path for C9387/C9388:

The surface location of C9387/C9388 was moved approximately 24 ft south and 2.6 ft to the east. The azimuth would change from 152 to 150 degrees from north and the closest distance to the tank would be 10.3 ft. Ms. Tabor identified that the distance from the tank was originally 28 ft in the sampling plan and this only thing that changed in Table 5-1 (i.e., target depth, piperun, and angle of the push did not change). Ms. Tabor provided a map view and cross sectional view of the change in

the direct push path. Ms. Tabor explained that due to tank farm activities and subsurface obstructions, no other location would meet the objectives of the DQO at C9387/C9388. The meeting attendees agreed that the new location is acceptable.

Mr. Barnes inquired about the possibility of placing subsurface electrodes at this location. The interest was due to concern that the concrete base of Tank 241-A-104 may be shattered. The electrodes may provide data to support this conclusion. Ms. Tabor stated that electrodes would be installed at this location.

The following is the information was presented to Ecology during the meeting:

- Handout "Attachment 1"
- Summary of rationale and general notes to support sample depth selection for C9392 (see Tables 1 in Attachment 1).
- A draft map depicting the actual direct push paths of C9391, C9393, and C9395. The map also showed the approximate extent of contamination, maximum temperature and depth seen at four of the direct push locations, and the apparent surface location of proposed samples at C9392.
- Draft Spectra Gamma & Moisture Surveys (geophysical logs) in ft piperun depth for C9391. The logs show the proposed sample depths along with lithologic/stratigraphic unit information.
- A draft cross section showing the relative location of the C9391/C9392 borehole path and sample depths with respect to the Tank 241-A-105.
- Hard copies of draft field geophysical logging results (gamma, moisture, temperature) from C9391.
- A draft map and cross section view comparing the original and new location and path for C9387/C9388.
- Table of available preliminary quick turn results from C9396, C9394, and C9386.

Action Items:
Action: Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes.

Rodrigo Cabos		5-8-2019
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Michael W. Barnes	Michael W Barnes	5-6-2019
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

WMA A-AX Focus Area Sample Depth Meeting – C9392
April 11, 2019

Sampling Hole

C9392: Surface, 7-9 ft bgs, and 12-14 ft bgs sample collected.

Data Evaluated to Help Determine Possible Sample Depths:

- Gamma, moisture, and temperature data for C9391 (30° angle push)
  Note: Plots are available in Vertical Depth (ft bgs) and Piperun Depth for C9392 since this is angle push.
- Vertical profile and cross section view of sample depths for C9392 (for depth perspective and relationship to tank)
- Relevant available dry well logging information (10-05-10 – corrosion at 64 ft bgs and Cs-137 from 76 to 86 ft)
- Sample depth information from C9386, C9394, and C9396.
- Logs from C9385, C9393, and C9395.

General Notes:

- The basis for standard sampling is described in RPP-RPT-60227, DQO Report WMA A-AX, Rev. 0 (Focus Area 1), which indicates that these samples are to be collected from:
  - Recommending 10 sample depths: 3 sample depths of - surface, 7-9, and 12-14 ft bgs (vertical depths) and 7 deeper samples (intervals recommended are identified in Table 1).
  - Specific information on shallower intervals for the 30° angle of C9392:
    1. 7 to 9 ft bgs is equivalent to 8 to 10 ft of piperun
    2. 12 to 14 ft bgs is equivalent to 14 to 16 ft of piperun

Table 1: Sample Depth Recommendations for C9391/C9392

Judgmental		Stratigraphy
Recommended Sample Depth (ft piperun)	**Reason**	
60-62	Elevated total gamma and moisture peak in H1 Near Base of Tank and Highest Temperature	H1
113-115	H1/H2 contact, increased moisture and total gamma Underneath Drywell Possible Leak Area	H2
158-160	Elevated total gamma (from 158 ft to 204 ft), area of increased moisture before decrease in moisture. Underneath Lateral Possible Leak Area	
190-192	Targeting maximum total gamma in push Underneath Lateral Possible Leak Area	
254-256	High moisture with increased total gamma at deeper depth Higher conductivity area.	
262-264	Low moisture with increased total gamma at deeper depth. Higher conductivity area.	
266-268	Increase in gamma and moisture. Higher conductivity area.	

Note: Stratigraphy is presented in ft of piperun.
Backfill = 0-~41 (based on additional information from C9393, H1 = 41-113, H2 = 113-279).

CHARACTERIZATION DEVIATION FORM

KS 7/29/19

Document: RPP-PLAN-62043 1 **Change Number:** A-AX_FA1-011 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 6/3/19

Original Requirement:
Section 5.2.2: "Upon completion of the final sample extraction, or upon meeting refusal, the dummy tip or sampler is removed, and the direct pushes are decommissioned per requirements of WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells."

Samples Impacted: None.

Proposed Change: Decommission the pushes with an ERT electrode assembly using a custom grout mixture consisting of Portland neat cement and ground pumice. The cement and ground pumice mixture is not an approved sealing material for decommissioning as identified in WAC 173-160.

Reason for Change:
The grout for sealing ERT equipped pushes must be high-strength, low-permeability, and low-conductivity cement. Bentonite, neat-cement grout, and/or Portland cement have a high electrical conductivity that interferes with ERT measurements. The project requested a variance from the Washington State Department of Ecology for the decommissioning requirements of WAC 173-160. A copy of the variance documenting approval of the cement and ground pumice mixture is included in Attachment A.

Date Change Effective: 6/3/19

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L **Date:** 7/9/19

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 7/9/2019

Field Work Supervisor (Print/Sign): Franzen, Rick L **Date:** 07/09/2019

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 7/9/19

Characterization Support Lead (Print/Sign): Becker, Dave J **Date:** 7/9/19

Page 1 of 1

Attachment A

ATKINS

2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

May 30, 2019

005493R

Mr. Jon Lindberg
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Request for Variance to WAC 173-160-460 for Direct Push Soil Borings Supporting the Hanford Site A-Farm Vadose Investigation/Characterization, Focus Area 1.

Dear Mr. Lindberg,

Atkins Federal EPC, Inc. (Atkins), under contract to Washington River Protection Solutions (WRPS), is using direct push technology for conducting geophysical logging and soil sampling in the 241-A-Tank Farm on the Hanford Site, Washington. These direct pushes are for the characterization of A-Farm contaminate distribution in the Vadose Zone.

Five locations within the A-Farm have been selected for conducting the investigations and characterizations. A total of 10 direct push borings will be installed, two vertical and eight at various angles. At each location two direct pushes will be conducted, one for conducting geophysical logging and installation of the deep electrodes, and a second for collection of soil samples. A Request for Variance, LT-5166670-GE-0001, dated May 16, 2018, addressing these installations was submitted and approved. A Notice of Intent to Construct a Soil Boring, No.: SE66223 and Notice of Intent to Decommission a Well, No.: AE49130, were submitted for the five pushes in which soil sampling will be conducted. These Soil Borings will be decommissioned directly following completion of the soil sampling in accordance with WAC 173-160 requirements. A Notice of Intent to Construct a Resource Protection Well, No.: RE15990, was submitted for the five pushes in which Electrical Resistivity Tomography (ERT) assemblies will be installed based on a previous ERT design.

The work is ongoing, with all the logging pushes completed and only one sampling push remaining. No ERT arrays have been installed. This Request for Variance addresses the ERT design change.

The previous approved design of the ERT assemblies consisted of one eight wire lead, one single wire lead, up to nine electrodes, and three ¼ inch diameter plastic tubes bundled together. Each electrode is 2 feet in length with the bottom electrode 18 inches in length. Spacing of the electrodes is either pre-determined or based on geophysical log data. The design incorporates the installation of the plastic tubes to allow hydration of the sand pack surrounding each electrode. Each tube will be perforated with weep holes to allow for hydration of the sand pack material placed around the electrodes, with each tube servicing three electrodes. This design resulted in a Resource Protection Monitoring Well completion.
The new ERT design consists of a sheathed cable that incorporates 32 equally spaced stainless-steel mesh electrodes, each electrode is 12 inches in length. Each cable is custom designed and fitted to each borehole. This design eliminates the inclusion of the wetting tubes.

ATKINS
Member of the SNC-Lavalin Group

2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

The ERT assembly installation process will be as follows:

1. Push tubing will be driven to depth and geophysical logging conducted.
2. The expendable drive tip for the direct push tubing will be knocked out.
3. The ERT assembly will be installed within the direct push tubing
4. A custom grout mixture consisting of 32% Portland neat cement and 68% DS-325 Hess Pozzolan (ground pumice) at an approximate 0.55 water to grout ratio will be used to seal the ERT assembly in the borehole. The grout mixture will be placed by tremie method from the bottom of the borehole to surface as the direct push tubing is extracted.
5. A protective surface casing will be installed to contain the ERT lead extending from the ground at completion.

Figure 1 shows the new ERT cable and electrode configuration. Table 1 provides ERT specifications by borehole. Only four ERT arrays will be installed for Focus Area 1.

Figure 1: ERT Cable with Stainless Steel Mesh Electrode

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2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

Table 1: ERT Specification by Borehole

Borehole ID	Borehole Total Depth (ft. of angled pipe run)	Cable Length (feet)		Electrode Spacing (feet)	Total of Electrodes
		Overall	Lead in		
C9387	295	305	26	9	32
C9391	278.7	289	25.5	8.5	32
C9393	295.1	305	26	9	32
C9395	196.8	207	19	6	32

A variance to WAC-173-160-460 for the decommissioning of environmental investigation borings utilizing direct push is requested. Specifically, the variance is for approval of the use of the custom grout mixture specified above and permanent installation of the ERT arrays for the decommissioning of the direct push investigation borings. Upon completion these boreholes will be considered as decommissioned. At the end of the useful life of the ERT, the cable will be cut off at ground surface.

Please provide your concurrence in the spaces provided below and return a copy for our project files. Please contact me at 509-942-4244 if you require additional information.

Sincerely,

Martin G Gardner

Martin Gardner
Project Manager

MGG/jll

cc: Paul Cavanah
Tracy Lippert
Richland Document Control

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
Jan Lindberg	J W Lindberg	Hydrogeologist	June 3 2019
NINA M. MENARD	Nina M. Menard	Cleanup Section Manager	6/3/19

3

CHARACTERIZATION DEVIATION FORM

Document: RPP-PLAN-62041 **Change Number:** A-AX_FA1-012 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 7/29/19

Original Requirement:
Table 6-1, *Analytical and Quality Control Requirements for WMA A-AX Focus Area 1*, identifies an LCS % recovery of 80-120% for percent water.

Samples Impacted: None.

Proposed Change: Remove the LCS % recovery requirement from percent water.

Reason for Change: LCS % recovery is not applicable to percent water.

Date Change Effective: 7/29/19

Schedule Impact: None

Authorization:

Project Manager (Print/Sign): Tabor, Cindy L **Date:** 7/30/19

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 7-30-2019

222-S Sample Management Office (Print/Sign): McKinney, Jo M **Date:** 7/30/19

Laboratory Project Coordinator (Print/Sign): Snyder, Susan M J **Date:** 7/30/19

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 7/30/19

Page 1 of 1

CHARACTERIZATION DEVIATION FORM

Document: RPP-PLAN-62041 **Change Number:** A-AX_FA1-013 **ECN to TSAP Required?** Y / N

Requestor: K. Schuyler **Date:** 7/29/19

Original Requirement:
RPP-PLAN-62041, Section 6.1.2: "A visual inspection will be performed to determine the liner that contains the highest moisture content. The contents of this liner will be used for the "quick turn" analysis."

Samples Impacted: Quick turn sample collected from C9388 interval 161-163 ft piperun.

Proposed Change: Perform quick turn analysis on soil collected in the shoe from C9388 at 161-163 ft piperun rather than a liner. Bulk density will not be measured for this quick turn sample, as it is not performed on anything but full liners (RPP-PLAN-62041, Section 6.1.2).

Reason for Change:
A visual inspection determined the soil collected in the shoe contained the highest moisture content.

Date Change Effective: 7/29/19

Schedule Impact: None.

Authorization:
Project Manager (Print/Sign): Tabor, Cindy L **Date:** 7/30/19

Quality Assurance (Print/Sign): Lungu, Cris C **Date:** 7-30-2019

222-S Sample Management Office (Print/Sign): McKinney, Steve G **Date:** 7/30/19

Data Management Representative (Print/Sign): Schuyler, Kimberly A **Date:** 7/30/19

Page 1 of 1

APPENDIX E

WASHINGTON STATE DEPARTMENT OF ECOLOGY DOCUMENTS

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ATKINS
Member of the SNC-Lavalin Group

2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

RECEIVED
MAY 21 2018
Department of Ecology
NWP - Richland

May 16, 2018

LT-5166670-GE-0001

COPY
Review & Recycle

Mr. Dwayne Crumpler
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland WA 99354

Subject: Request for Variance to WAC 173-160-410 for Direct Push Soil Boring and Resource Protection Wells Supporting the Hanford Site A-Farm Vadose Investigation/Characterization

Dear Mr. Crumpler,

Atkins Federal EPC, Inc. (Atkins), under contract to Washington River Protection Solutions (WRPS), will be using direct push technology for conducting geophysical logging and soil sampling in the 241-A-Tank Farm on the Hanford Site, Washington. These direct pushes are for the characterization of A-Farm contaminate distribution in the Vadose Zone. The information acquired from the logging and sampling effort is intended to provide characterization information for the optimization of the installation of deep electrodes for electrical resistivity imaging.

Five locations within the A-Farm have been selected for conducting the investigations and characterizations. A total of 10 direct push boring will be installed, two vertical and eight at various angles. At each location two direct pushes will be conducted, one for conducting geophysical logging and installation of the deep electrodes, and a second for collection of soil samples. A Notice of Intent to Construct a Resource Protection Well, No.: RE15990; has been submitted to the Department of Ecology (Ecology) for the five pushes in which deep electrodes will be installed. A Notice of Intent to Construct a Soil Boring, No.: SE66223 and Notice of Intent to Decommission a Well, No.: AE49130, have also been submitted for the five pushes in which soil sampling will be conducted. These Soil Borings will be decommissioned directly following completion of the soil sampling in accordance with WAC 173-160 requirements. The current schedule is to initiate the field activities by May 22, 2018. It is anticipated that the work will take approximately 8-10 months to complete. The target depths for the pushes are from 260 ft. to 280 ft. below ground surface or to refusal. Borehole coordinates are provided in Table 1. A variance to the WAC 173-160-451 is being requested as these direct pushes will be greater than 30 feet in depth.

Table 1. A-Farm Borehole Coordinates

Borehole #	Easting	Northing	Elevation
C9385/C9386	575332.62	136087.015	210.87
C9387/C9388	575304.28	136104.30	211.02
C9391/C9392	575349.04	136102.45	210.63
C9393/C9394	575355.23	136102.515	210.58
C9395/C9396	575363.23	136104.44	210.52

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The deep electrode assemblies consist of one eight wire lead, one single wire lead, nine electrodes, and three ¼ inch diameter plastic tubes bundled together. Each electrode is 2 feet in length with the bottom electrode 18 inches in length. Spacing of the electrodes is either pre-determined or based on geophysical log data. The design incorporates the installation of the plastic tubes to allow hydration of the sand pack surrounding each electrode. Each tube will be perforated with weep holes to allow for hydration of the sand pack material placed around the electrodes, with each tube servicing three electrodes. Example sketches of past deep electrode installations are attached.

The deep electrode installation process will be as follows:

1. Push tubing will be driven to depth and geophysical logging conducted.
2. The expendable drive tip for the direct push tubing will be knocked out.
3. Bentonite crumbles will be placed by tremie tube from bottom of the boring up to 3 feet from the bottom of the first probe placement.
4. The deep electrode assembly will be placed in the borehole thru the direct push tubing.
5. A sand pack will be placed by tremie from the top of the bentonite at 3 feet below to 3 feet above the electrode for a total of 6 feet of sand pack. The sand pack will consist of a 75%/25% by weight mixture of 20/40 silica sand and diatomatious earth.
6. 1-2 gallons of water will be tremmied to the sand pack to wet the material.
7. Bentonite crumbles will then be placed by tremie from the top of the sand pack to 3 feet from the bottom of the next electrode placement.
8. Steps 5 thru 7 will be repeated for the remaining electrodes.
9. Bentonite crumbles will be placed from the top of the sand pack of the uppermost electrode to ground surface.

In accordance with WAC 173-160-440 (1), the direct push rig and all direct push equipment and tooling must be steam cleaned onsite before and after well construction. This requirement for steam cleaning is complied with for all rigs and equipment that are "free" released from the tank farms. "Free" release means that the equipment has been surveyed and found free of radiological contamination. The radiological survey and release is conducted under the Client Radiological Program and is in accordance with a Release Plan written by their radiological organization. At this time, due to current radiation survey methodologies and release criteria, a "free" release cannot be given for tubular goods (e.g., drill pipe, push tubing, etc.) as the interior surfaces of the materials cannot be directly surveyed. Therefore, these tubular goods, are designated as "potentially radiological contaminated".

There is currently no facility at which steam cleaning of potentially radiological contaminated materials can be performed. Under current radiation control requirements at the Hanford Site, the tubular goods can be bagged and transported out of a tank farm but within the confines of the Hanford Site, as "potentially radiological contaminated" materials and must be handled and stored in accordance with radiation control procedures. The radiological controlled push tubing may be re-used within the other radiological contaminated areas on the Hanford Site for additional direct push investigations following field cleaning. The field cleaning involves wiping down the exterior and interior of the tubing using a cleaning agent (e.g., Simple Green) to remove any smearable contamination.

ATKINS

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Richland, WA 99354
www.atkinsglobal.com/energy

It is requested that he State of Washington, Department of Ecology provide an exemption from the requirement to steam clean the non-releasable tubular goods prior to re-use within a radiological contaminated area. This exemption has been provided for all past tank farm direct push investigations, but it our desire to make this request and receive exemption for each individual investigation project.

Please provide your concurrence in the spaces provided below and return a copy for our project files. Please contact me at 942-4244 if you require additional information.

Sincerely,

Martin Gardner
Project Manager

MGG/jil

Attachment:
Example Sketches of Deep Electrode Placement

cc: Paul Cavanah
Tracy Lippert
Richland Document Control

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
AVERY RICHARDSON LHG		WELL CONSTRUCTION COORDINATOR	6/1/2018
Cheryl Wharton		Cleanup Section Manager	6/4/18

DEPARTMENT OF ECOLOGY State of Washington

Water Resources Program
Variance Request- Minimum Standards for Well Construction

WAC173-160-106(1) allows you to request a variance from the Department of Ecology when strict compliance with state well construction standards is impractical. The variance request must propose comparable alternative specifications that will provide equal or greater human health and resource protection than the minimum standards. You must apply for a variance in writing and receive approval before constructing or decommissioning the well. (All fields must be completed.)

Requested by: Martin Gardner

Mailing Address: 2345 Stevens Drive, Ste. 240 City Richland State WA Zip 99354

Daytime Phone: 509-942-4244 Date: 5/16/18

Property Owner (if different): US Department of Energy

Site Location: SE ¼ SE ¼ Section 02 Township 12N Range 26E ☒ E or ☐ WWM

Tax Parcel Number

Well Address: Hanford Site

Well Driller/Company (if known): Kelly Olson (#1217), Atkins Energy Federal EPC, INC.

Check one: ☐ Water Well ☒ Resource Protection Well ☐ Dewatering Well

What construction standard cannot be met?

- WAC 173-160-451
- WAC 173-160-440 (1)

Reason why standard cannot be met. Include site map and distances from all known potential sources of contamination if setback variance is being requested.

PLEASE SEE ATTACHED LETTER # LT-5166670-GE-0001 FOR DETAILS OF VARIANCE REQUEST.

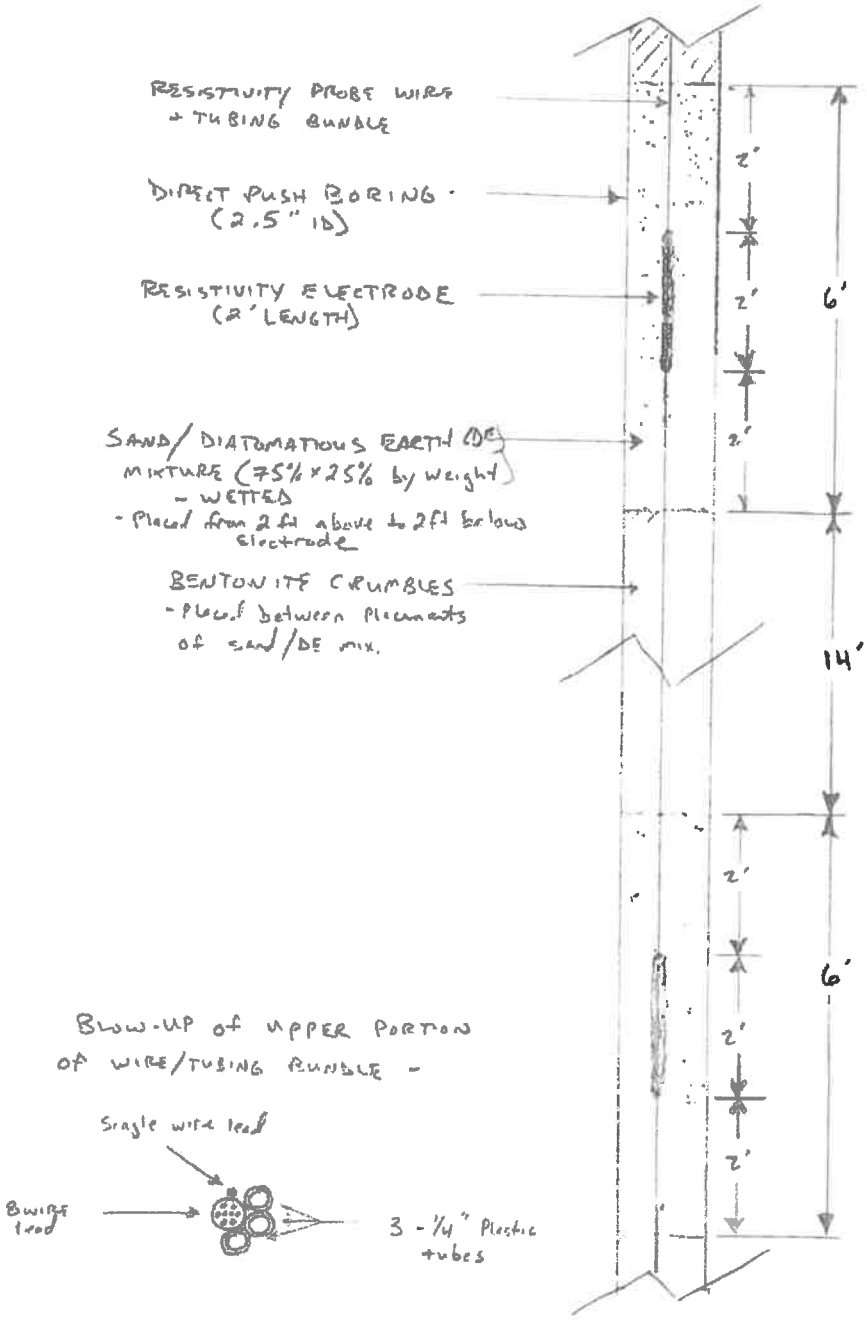
Alternative construction method that will provide equal or greater protections than those provided by the minimum standard. N/A

(Attach additional pages if necessary.) Complete and return with your site map to the appropriate regional office:

Northwest Regional Office	Southwest Regional Office	Eastern Regional Office	Central Regional Office
ATTN: Noel Philip	ATTN: John Pearch	ATTN: Mark Ader	ATTN: Avery Richardson
3190 160th Avenue SE	PO Box 47775	N 4601 Monroe	15 W Yakima Ave #200
Bellevue, WA 98008	Olympia, WA 98504	Spokane, WA 99205	Yakima, WA 98902
425-649-7044	360-407-0297	509-329-3544	509-575-2639
Fax: 425-649-7098	Fax: 360-407-0284	Fax: 509-329-3529	Fax: 509-454-7830
nphi461@ecy.wa.gov	jope461@ecy.wa.gov	made461@ecy.wa.gov	aric461@ecy.wa.gov

ECY 070-299(Revised 08-09) *If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

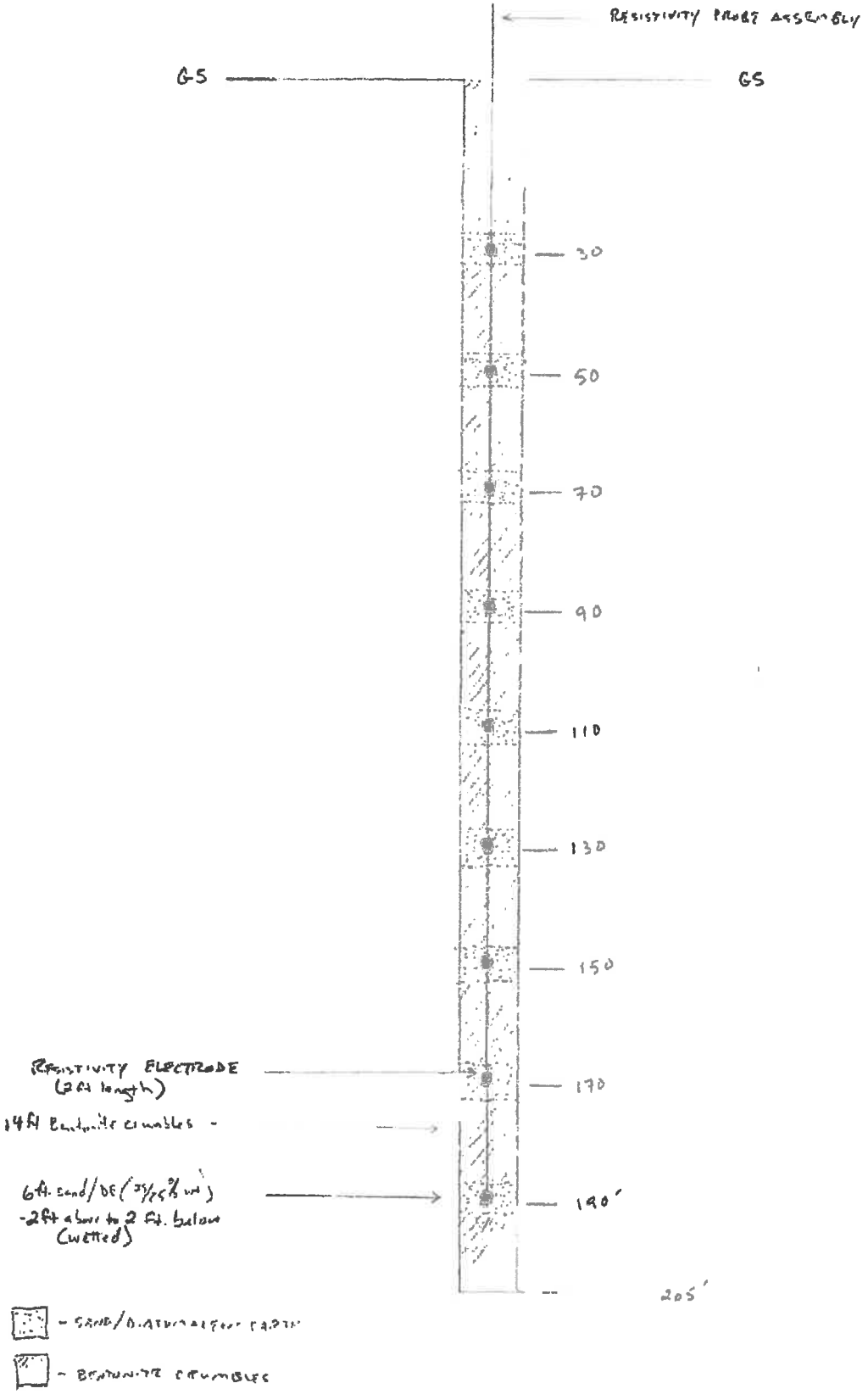
RESISTIVITY PROBE PLACEMENT AND COMPLETION FOR DIRECT PUSH BOREHOLES



Note: The Plastic tubes each provide access to 3 electrodes to allow for addition of water as needed to wet the sand/DE surrounding the electrodes after well completion. The perforations extend from 6" above to 6" below each electrode.

Example

Bottom Probe Set @ 190'



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 **SE66223**

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: US Department Of Energy — Phone Number:
   Mailing Address: 825 Jadwon Ave. — City: Richland — State: WA — Zip Code: 99352
2. Agent (if different from above) — Phone Number:
   Mailing Address — City — State — Zip Code
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			City: Hanford Site	State: WA	Zip Code
Tax Parcel Number	Township: 12N	Range: 26E	Section: 2	¼ (within 160 acres): SE	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: Soil Sampling — Project Name: WRPS A-Farm Vadose Direct Push
5. Estimated Start Date: 6/4/2018
6. Professional's License Number
7. Well Drilling Company Name: ATKINS ENERGY FEDERAL EPC INC. — Phone Number: (509) 420-5617
8. Well Driller Name: KELLY OLSON — Driller License Number: 1217
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: 5

This notification number must be provided to your driller: **SE66223**

No fees are associated with this type of well construction.

Marty.Gardner@Atkinsglobal.com

Your Notice of Intent has been processed as of 5/15/2018

DEPARTMENT OF ECOLOGY State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE49130**

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: US Department Of Energy		Phone Number	
Mailing Address: 825 Jadwon Ave.	City: Richland	State: WA	Zip Code: 99352
2. Agent (if different from above)		Phone Number	
Mailing Address	City	State	Zip Code

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	City: Hanford Site		State: WA	Zip Code	
Tax Parcel Number	Township: 12N	Range: 26E	Section: 2	¼ (within 160 acres): SE	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: SE66223 — Unique Well Tag Number of well being decomissioned (if applicable):

5. Well Type to Decommission: Geotech Soil Boring/Sampling Well - No Fee — How Many? 5

6. Estimated Decommission Start Date: 6/4/2018 — Project Name: WRPS A-Farm Vadose Direct Push

7. Professional's License Number:

8. Well Drilling Company Name: ATKINS ENERGY FEDERAL EPC INC. — Phone Number: (509) 420-5617

9. Well Driller Name: KELLY OLSON — Driller License Number: 1217

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 $	$0.00

This notification number must be provided to your driller:

AE49130

Marty.Gardner@Atkinsglobal.com

Your Notice of Intent has been processed as of 5/15/2018

RPP-ENV-61860, Rev. 0

DEPARTMENT OF ECOLOGY State of Washington

Notice of Intent to Construct an Resource Protection Well

Notification Number

RE15990

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: US Department Of Energy | Phone Number:
   Mailing Address: 825 Jadwin Ave | City: Richland | State: WA | Zip Code: 99353
2. Agent (if different from above): | Phone Number:
   Mailing Address: | City: | State: | Zip Code:
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: | City: Hanford Site | State: WA | Zip Code:

Tax Parcel Number	Township	Range	Section	¼ (within 160 acres)	¼ -¼ (within 40 acres)
	12N	26E	2	SE	SE

Latitude Degrees	Latitude Time min sec	Horizontal Collection Method
Longitude Degrees	Longitude Time min sec	

4. Estimated Start Date: 5/29/2018 | Project Name: A-Farm Vadose Direct Push
5. Professional's License Number:
6. Well Drilling Company Name: ATKINS ENERGY FEDERAL EPC INC. | Phone Number:
7. Well Driller Name: KELLY OLSON | Driller License Number: 1217
8. **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
Fee Amount: $40.00 per well

Total Number of wells = 5 x $ 40 each

Total Due and Amount Enclosed $200.00

This notification number must be provided to your driller:

RE15990

Marty.Gardner@Atkinsglobal.com

Accepted: 5/15/2018 10:34. Confirmation Number: 18051554348946. This begins your 72 hour wait period.

Instructions

Item 1: Property owner's name, daytime phone number and mailing address.

Item 2: If a consulting firm is acting as your agent and is submitting the notification fee, please provide their name, mailing address and daytime phone number.

Item 3: Complete county name and code number from drop down list. If the site street address is available, please fill in the complete address here. Include city and zip code. Please enter the tax parcel number if available. NOTE: Include all dashes and zeros. Please provide the Township, Range, Section, where the well is located. This information can be found in your property legal description or the County Assessor's Office.

Item 4: Type of Construction – check the appropriate box.

Item 5-8: This information should be available from your well driller.

For Assistance

Contact the Department of Ecology Regional Office where the well is located.

Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima counties contact:

Central Regional Office (CRO) (509) 575-2490 TTY 711 and 1-800-833-6388

Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman counties contact:

Eastern Regional Office (ERO) (509) 329-3400 TTY 711 and 1-800-833-6388

Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom counties contact:

Northwest Regional Office (NWRO) (425) 649-7000 TTY 711 and 1-800-833-6388

Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum counties contact:

Southwest Regional Office (SWRO) (360) 407-6300 TTY 711 and 1-800-833-6388

ECY 040- 22 To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

SNC•LAVALIN ATKINS Member of the SNC Lavalin Group

2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

October 8, 2018 005399R

Mr. Jeff Ayres
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Request for Variance to WAC 173-160-460 for Direct Push Resource Protection Wells Decommissioning Supporting the Hanford Site A-Farm Vadose Investigation/Characterization

Dear Mr. Ayres,

Atkins Federal EPC, Inc. (Atkins), under contract to Washington River Protection Solutions (WRPS), is using direct push technology for conducting geophysical logging and soil sampling in the 241-A-Tank Farm on the Hanford Site, Washington. These direct pushes are for the characterization of A-Farm contaminate distribution in the Vadose Zone. The information acquired from the logging and sampling effort is intended to provide characterization information for the optimization of the installation of deep electrodes for electrical resistivity imaging. A Notice of Intent to Construct a Resource Protection Well, No.: RE15990, was submitted to the Department of Ecology (Ecology) for the five pushes in which deep electrodes will be installed. A Variance Request for the direct push work was also approved by Ecology.

The work is being performed at 5 locations within the A-Farm. At each location direct push is being used to drive tubing to target depth and for the Resource Protection Wells, conduct geophysical logging suites and install Electrical Resistivity Probes. At two locations, Hanford ID #C9385 and C9391, the drive tubing was successfully driven to the target depth but was discovered to have experienced parted tubing. In push hole C-9385 the tubing parted at a depth of ~73 ft. below ground surface. In push hole C-9391 the tubing parted at a depth of ~180 ft. below ground surface. The push tubing is 2-1/2" outside diameter with a 1-3/4" inside diameter. Experience acquired from previous direct push projects performed on the Hanford Site has shown that retrieval of the lower section of parted tubing is not feasible. Efforts to retrieve parted tubing has been unsuccessful in all past efforts. Table 1 provides the Borehole Coordinates.

Table 1. A-Farm Borehole Coordinates

Borehole #	Easting	Northing	Elevation
C9385	575332.62	136087.015	210.87
C9391	575349.04	136102.45	210.63

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2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

A Spectral Gamma Combo Geophysical Logging tool was lost down the drive tubing in push hole C-9385. This tool was successfully retrieved in its entirety on October 8, 2018.

A Variance to WAC-173-160-460 for the decommissioning of Direct Push borings is being requested. Attached are figures with the proposed decommissioning plans. The proposal is to place bentonite crumbles from total depth to ground surface. The bentonite will be placed from the bottom of the push hole using tremie tubing. The bentonite will be placed to the top of the parted tubing, then as the upper tubing is being removed, the open push hole will be filled with the bentonite thru the tremie tubing to ground surface. Notice of Intent to Decommission a Resource Protection Well, AE51459, was submitted on October 4, 2018.

Please provide your concurrence in the spaces provided below and return a copy for our project files. Please contact me at 942-4244 if you require additional information.

Sincerely,

Martin Gardner
Project Manager

MGG/jll

Attachment:
- Variance Request Form
- Notice of Intent to Decommission a Well AE51459
- C-9385 Decommissioning Plan
- C-9391 Decommissioning Plan

cc: Paul Cavanah
Tracy Lippert
Richland Document Control

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
Jeff Ayres		Senior Hydrogeologist	10/9/18
Cheryl Whalen		Section Manager	10/9/18

DEPARTMENT OF ECOLOGY State of Washington

Water Resources Program
Variance Request- Minimum Standards for Well Construction

WAC173-160-106(1) allows you to request a variance from the Department of Ecology when strict compliance with state well construction standards is impractical. The variance request must propose comparable alternative specifications that will provide equal or greater human health and resource protection than the minimum standards. You must apply for a variance in writing and receive approval before constructing or decommissioning the well. (All fields must be completed.)

Requested by: Martin Gardner

Mailing Address: 2345 Stevens Drive City Richland State WA Zip 99354

Daytime Phone: 509-578-5533 Date: 10-8-2018

Property Owner (if different): US Department of Energy

Site Location: SE ¼ SE ¼ Section 2 Township 12N Range 26E ☒ E or ☐ WWM

Tax Parcel Number

Well Address: Hanford Site, 241-A Tank Farm

Well Driller/Company (if known): Kelly Olson #1217, Atkins

Check one: ☐ Water Well ☒ Resource Protection Well ☐ Dewatering Well

What construction standard cannot be met? WAC - 173 - 160 - 460 - DECOMMISSIONING DIRECT PUSH BORINGS

Reason why standard cannot be met. Include site map and distances from all known potential sources of contamination if setback variance is being requested. DURING CONSTRUCTION OF RESOURCE PROTECT WELLS FOR GEOPHYSICAL LOGGING AND INSTALLATION OF RESISTIVITY PROBES, TWO INSTALLATIONS EXPERIENCED DRIVE PIPE FAILURE. THE WELLS WERE BEING CONSTRUCTED USING DIRECT PUSH TECHNOLOGY. UNABLE TO REMOVE LOWER DRIVE PIPE FOR DECOMMISSIONING.

Alternative construction method that will provide equal or greater protections than those provided by the minimum standard. SEE ATTACHED DECOMMISSIONING PLANS.

(Attach additional pages if necessary.) Complete and return with your site map to the appropriate regional office:

Northwest Regional Office	Southwest Regional Office	Eastern Regional Office	Central Regional Office
ATTN: Noel Philip	ATTN: John Pearch	ATTN: Mark Ader	ATTN: Avery Richardson
3190 160th Avenue SE	PO Box 47775	N 4601 Monroe	15 W Yakima Ave #200
Bellevue, WA 98008	Olympia, WA 98504	Spokane, WA 99205	Yakima, WA 98902
425-649-7044	360-407-0297	509-329-3544	509-575-2639
Fax: 425-649-7098	Fax: 360-407-0284	Fax: 509-329-3529	Fax: 509-454-7830
nphi461@ecy.wa.gov	jope461@ecy.wa.gov	made461@ecy.wa.gov	aric461@ecy.wa.gov

ECY 070-299(Revised 08-09) *If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

DEPARTMENT OF ECOLOGY State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE51459**

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 USUS Department Of Energy		Phone Number	
Mailing Address 825 Jadwin Ave	City Richland	State WA	Zip Code 99353
2. Agent (if different from above)		Phone Number	
Mailing Address	City	State	Zip Code

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	City Hanford Site			State WA	Zip Code
Tax Parcel Number	Township 12N	Range 26E	Section 2	¼ (within 160 acres) SE	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 RE15990 Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission
Resource Protection - $20.00 each Revised Code: 027-WEL1**-02-87-000101 How Many? 2

6. Estimated Decommission Start Date 10/9/2018 Project Name A-Farm Vadose Direct Push

7. Professional's License Number

8. Well Drilling Company Name ATKINS ENERGY FEDERAL EPC INC. Phone Number

9. Well Driller Name KELLY OLSON Driller License Number 1217

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 $ $40.00

This notification number must be provided to your driller:

AE51459

Marty.Gardner@Atkinsglobal.com

Accepted: 10/4/2018 7:56. Confirmation Number: 18100479291792. This begins your 72 hour wait period.

Instructions

Item 1: Property owner's name, daytime phone number and mailing address.

Item 2: Agent - If the driller, consultant or other person is acting as your agent and is submitting the notification fee, please provide their name, mailing address and daytime phone number

Item 3: Complete county name and code number from drop down list. If the site street address is available, please fill in the complete address here. Include city and zip code. Please enter the tax parcel number if available. NOTE: Include all dashes and zeros. Please provide the Township, Range, Section, where the well is located. This information can be found in your property legal description or the County Assessor's Office

Item 4: Please enter the original construction notice of intent number if available.

Item 5: Type of well to decommission. Please note those wells that require a fee and those that do not.

Item 6: Enter the approximate decommissioning start date.

Item 7-11: This information should be available from your well driller.

For Assistance

Contact the Department of Ecology Regional Office where the well is located.

Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima counties contact:

Central Regional Office (CRO) (509) 575-2490 TTY 711 and 1-800-833-6388

Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman counties contact:

Eastern Regional Office (ERO) (509) 329-3400 TTY 711 and 1-800-833-6388

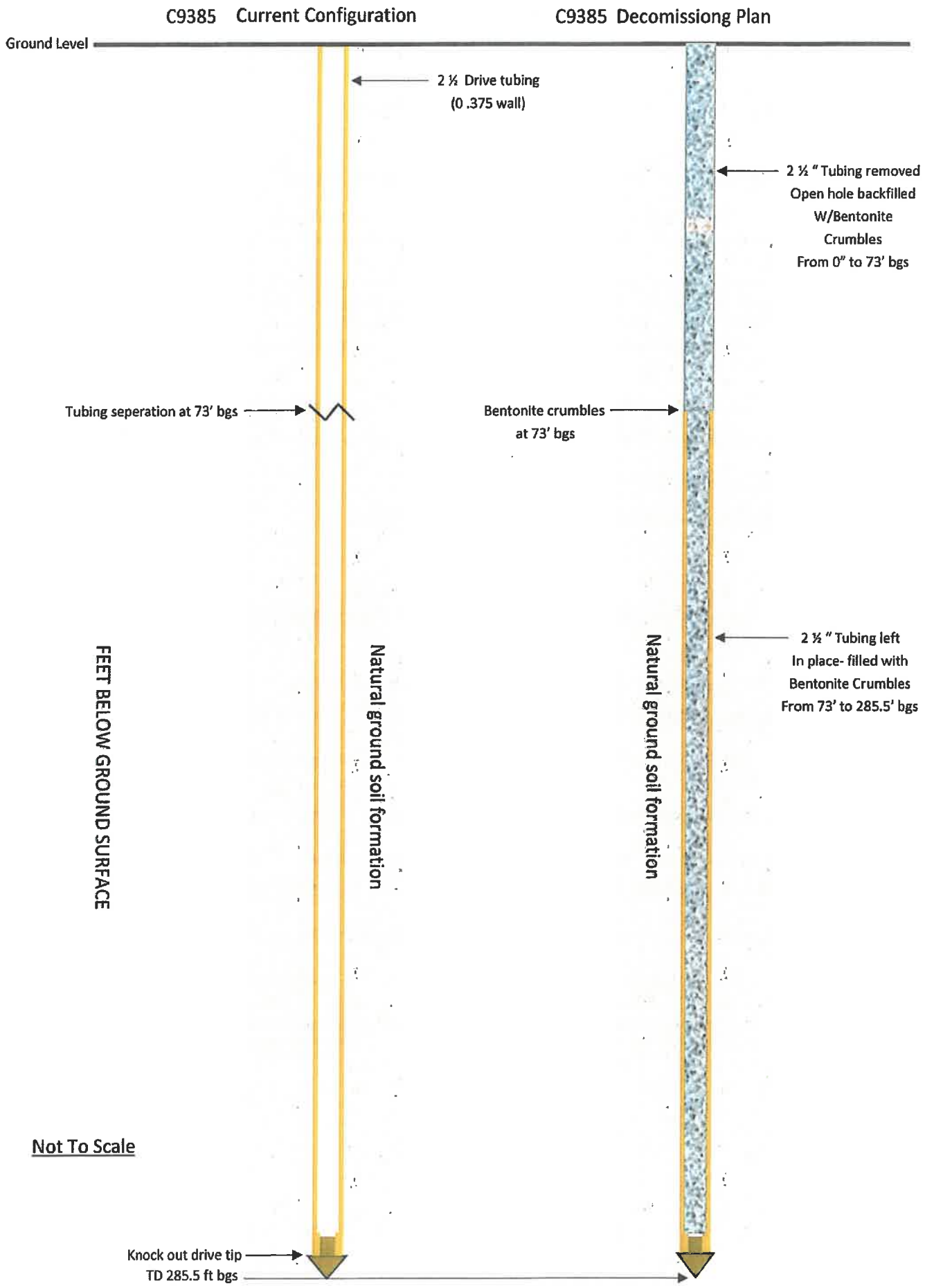
Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom counties contact:

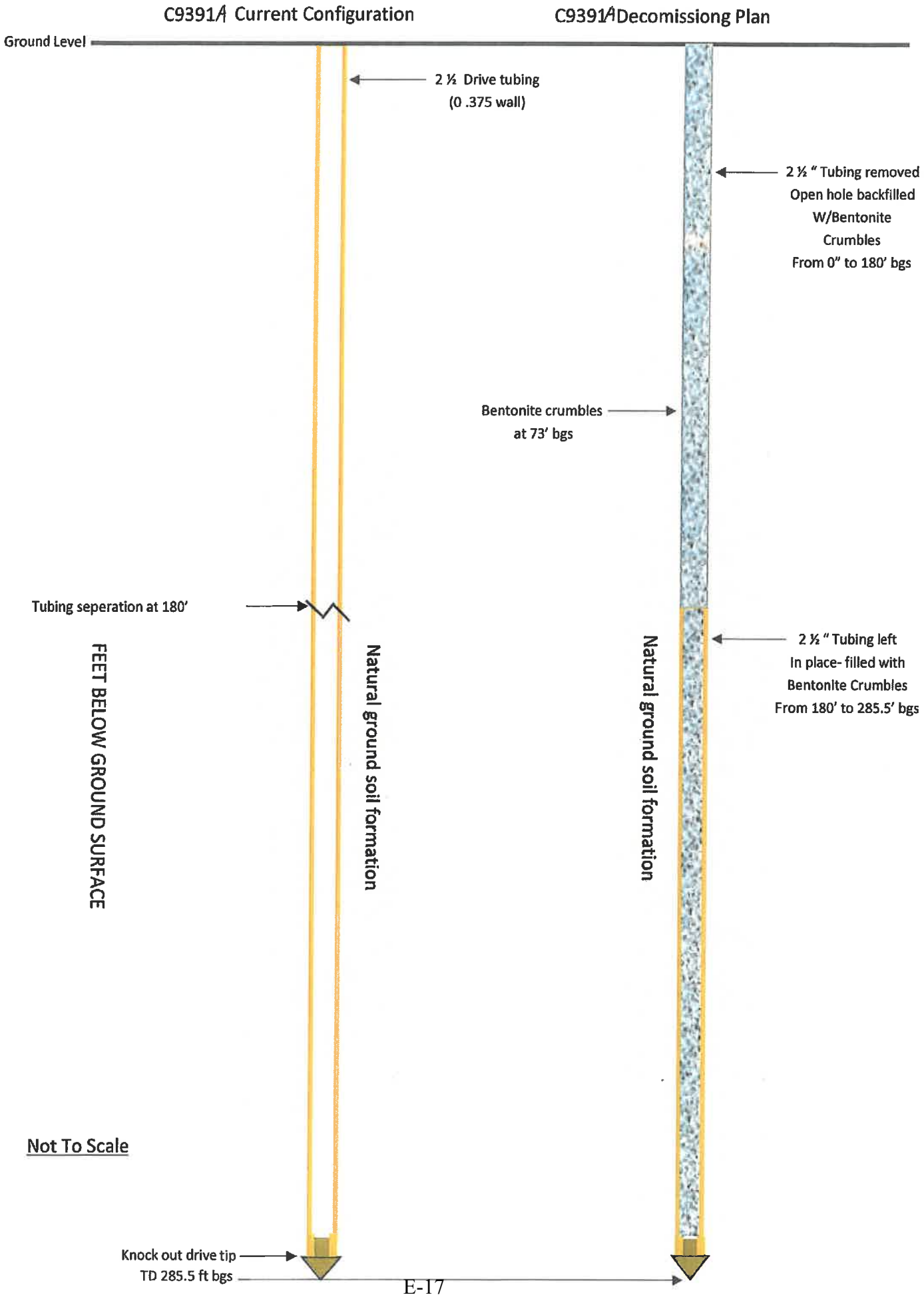
Northwest Regional Office (NWRO) (425) 649-7000 TTY 711 and 1-800-833-6388

Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum counties contact:

Southwest Regional Office (SWRO) (360) 407-6300 TTY 711 and 1-800-833-6388

ECY 040- 24 To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.


C9385 Current Configuration
C9385 Decomissiong Plan
Ground Level
2 ½ Drive tubing
(0 .375 wall)
2 ½ " Tubing removed
Open hole backfilled
W/Bentonite
Crumbles
From 0" to 73' bgs
Tubing seperation at 73' bgs
Bentonite crumbles
at 73' bgs
2 ½ " Tubing left
In place- filled with
Bentonite Crumbles
From 73' to 285.5' bgs
FEET BELOW GROUND SURFACE
Natural ground soil formation
Natural ground soil formation
Not To Scale
Knock out drive tip
TD 285.5 ft bgs


C9391A Current Configuration
C9391A Decomissiong Plan
Ground Level
2 ½ Drive tubing
(0 .375 wall)
2 ½ " Tubing removed
Open hole backfilled
W/Bentonite
Crumbles
From 0" to 180' bgs
Bentonite crumbles
at 73' bgs
Tubing seperation at 180'
2 ½ " Tubing left
In place- filled with
Bentonite Crumbles
From 180' to 285.5' bgs
FEET BELOW GROUND SURFACE
Natural ground soil formation
Natural ground soil formation
Not To Scale
Knock out drive tip
TD 285.5 ft bgs

DEPARTMENT OF ECOLOGY State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE51459**

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: USUS Department Of Energy		Phone Number	
Mailing Address: 825 Jadwin Ave	City: Richland	State: WA	Zip Code: 99353
2. Agent (if different from above)		Phone Number	
Mailing Address	City	State	Zip Code

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			City: Hanford Site	State: WA	Zip Code
Tax Parcel Number	Township: 12N	Range: 26E	Section: 2	¼ (within 160 acres): SE	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: RE15990 Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission
Resource Protection - $20.00 each Revised Code: 027-WEL1**-02-87-000101 How Many? 2

6. Estimated Decommission Start Date: 10/9/2018 Project Name: A-Farm Vadose Direct Push

7. Professional's License Number

8. Well Drilling Company Name: ATKINS ENERGY FEDERAL EPC INC. Phone Number

9. Well Driller Name: KELLY OLSON Driller License Number: 1217

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
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Marty.Gardner@Atkinsglobal.com

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Item 4: Please enter the original construction notice of intent number if available.

Item 5: Type of well to decommission. Please note those wells that require a fee and those that do not.

Item 6: Enter the approximate decommissioning start date.

Item 7-11: This information should be available from your well driller.

For Assistance

Contact the Department of Ecology Regional Office where the well is located.

Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima counties contact:

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Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum counties contact:

Southwest Regional Office (SWRO) (360) 407-6300 TTY 711 and 1-800-833-6388

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SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

2345 Stevens Drive, Suite 240
Richland, WA 99354

October 24, 2018 005409R

Mr. Jeff Ayres
State of Washington
Department of Ecology
Nuclear Waste Program
Hanford Project
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Resource Protection Well Report for Hanford Site Well C9385~~A~~ RZS 9-12-19

To Mr. Ayres,

Attached is a Resource Protection Well Report form addressing the decommissioning of 1 direct push resource protection well installed in the 241-A Tank Farm of the Hanford Site, Richland, Washington. The Hanford Well ID is C9385~~A~~ RZS 9-12-19. The Ecology Well ID assigned is Tag No. AA0 149. The direct push boring was not completed due to broken drive tubing and was decommissioned. Well construction was conducted under original Notice of Intent No. RE15990 and decommissioned under Notice of Intent No. AE51459. The well decommissioning was completed on October 17, 2018. Decommissioning was conducted in accordance with WAC-160-173 requirements and the Department of Ecology approved Request for Variance, which is provided as Attachment 2.

If you have any questions, please contact me at 509-578-5533 or Martin.Gardner@atkinsglobalns.com.

Sincerely,

Martin Gardner
Project Manager

MGG/jil

Attachments:

1. Resource Protection Well Report for Hanford Well C9385~~A~~ RZS 9-12-19 (NOI AE51459)
2. Request for Variance, 005399R, October 8, 2018

cc: Cynthia Tabor (WRPS)
Paul Cavanah
Tracy Lippert
Richland Document Control

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

2345 Stevens Drive, Suite 240
Richland, WA 99354

October 24, 2018

005410R

Mr. Jeff Ayres
State of Washington
Department of Ecology
Nuclear Waste Program
Hanford Project
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Resource Protection Well Report for Hanford Site Well C9391A

To Mr. Ayres,

Attached is a Resource Protection Well Report form addressing the decommissioning of 1 direct push resource protection well installed in the 241-A Tank Farm of the Hanford Site, Richland, Washington. The Hanford Well ID is C9391A. The Ecology Well ID assigned is Tag No. AA0 150. The direct push boring was not completed due to broken drive tubing and was decommissioned. Well construction was conducted under original Notice of Intent No. RE15990 and decommissioned under Notice of Intent No. AE51459. The well decommissioning was completed on October 11, 2018. Decommissioning was conducted in accordance with WAC-160-173 requirements and the Department of Ecology approved Request for Variance, which is provided as Attachment 2.

If you have any questions, please contact me at 509-578-5533 or Martin.Gardner@atkinsglobalns.com.

Sincerely,

Martin Gardner
Project Manager

MGG/jll

Attachments:
1. Resource Protection Well Report for Hanford Well C9391A (NOI AE51459)
2. Request for Variance, 005399R, October 8, 2018

cc: Cynthia Tabor (WRPS)
Paul Cavanah
Tracy Lippert
Richland Document Control

ECOLOGY

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⇨ Original NOI No. RE15990

Ecology Well ID Tag No. AA0 150

Site Well Name C9391A

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth. Decommissioning required leaving tubing in the ground due to broken drive tubing and inability to retrieve.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE51459

Type of Well:

☒ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☐ Environmental Boring ☐ Other
↳ ☐ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 2.5 inches Casing diameter 2.5 inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☒ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

Start Date 10/10/2018 Completed Date 10/11/2018

Construction Design	Well Data	Driller's Log
See attached well completion diagram.	Hanford Well ID #C9391A. Well is located at the Hanford Site 241-A Tank Farm. Well constructed using direct push. Intent of construction to collect geophysical log data and complete as a leak detection well with installation of resistivity probes. Tubing was driven to a total depth of 285.5 ft. bgs. A borehole camera was run to examine the inside of tubing. It was discovered that the drive tubing parted at 180 ft. bgs. No logging was performed. The boring was not completed as a resource protection well, but was decommissioned. The decommissioning was accomplished with the placement of bentonite crumbles from total depth to ground surface thru tremie tube. The upper 180 ft. of tubing was extracted as the bentonite was placed. No surface monument was installed	N/A

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

October 8, 2018 005399R

Mr. Jeff Ayres
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Request for Variance to WAC 173-160-460 for Direct Push Resource Protection Wells Decommissioning Supporting the Hanford Site A-Farm Vadose Investigation/Characterization

Dear Mr. Ayres,

Atkins Federal EPC, Inc. (Atkins), under contract to Washington River Protection Solutions (WRPS), is using direct push technology for conducting geophysical logging and soil sampling in the 241-A-Tank Farm on the Hanford Site, Washington. These direct pushes are for the characterization of A-Farm contaminate distribution in the Vadose Zone. The information acquired from the logging and sampling effort is intended to provide characterization information for the optimization of the installation of deep electrodes for electrical resistivity imaging. A Notice of Intent to Construct a Resource Protection Well, No.: RE15990, was submitted to the Department of Ecology (Ecology) for the five pushes in which deep electrodes will be installed. A Variance Request for the direct push work was also approved by Ecology.

The work is being performed at 5 locations within the A-Farm. At each location direct push is being used to drive tubing to target depth and for the Resource Protection Wells, conduct geophysical logging suites and install Electrical Resistivity Probes. At two locations, Hanford ID #C9385 and C9391, the drive tubing was successfully driven to the target depth but was discovered to have experienced parted tubing. In push hole C-9385 the tubing parted at a depth of ~73 ft. below ground surface. In push hole C-9391 the tubing parted at a depth of ~180 ft. below ground surface. The push tubing is 2-1/2" outside diameter with a 1-3/4" inside diameter. Experience acquired from previous direct push projects performed on the Hanford Site has shown that retrieval of the lower section of parted tubing is not feasible. Efforts to retrieve parted tubing has been unsuccessful in all past efforts. Table 1 provides the Borehole Coordinates.

Table 1. A-Farm Borehole Coordinates

Borehole #	Easting	Northing	Elevation
C9385	575332.62	136087.015	210.87
C9391	575349.04	136102.45	210.63

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

A Spectral Gamma Combo Geophysical Logging tool was lost down the drive tubing in push hole C-9385. This tool was successfully retrieved in its entirety on October 8, 2018.

A Variance to WAC-173-160-460 for the decommissioning of Direct Push borings is being requested. Attached are figures with the proposed decommissioning plans. The proposal is to place bentonite crumbles from total depth to ground surface. The bentonite will be placed from the bottom of the push hole using tremie tubing. The bentonite will be placed to the top of the parted tubing, then as the upper tubing is being removed, the open push hole will be filled with the bentonite thru the tremie tubing to ground surface. Notice of Intent to Decommission a Resource Protection Well, AE51459, was submitted on October 4, 2018.

Please provide your concurrence in the spaces provided below and return a copy for our project files. Please contact me at 942-4244 if you require additional information.

Sincerely,

Martin Gardner
Project Manager

MGG/jil

Attachment:
- Variance Request Form
- Notice of Intent to Decommission a Well AE51459
- C-9385 Decommissioning Plan
- C-9391 Decommissioning Plan

cc: Paul Cavanah
Tracy Lippert
Richland Document Control

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
Jeff Ayres		Senior Hydrogeologist	10/9/18
Cheryl Whalen		Section Manager	10/9/18

DEPARTMENT OF ECOLOGY State of Washington

Water Resources Program

Variance Request- Minimum Standards for Well Construction

WAC173-160-106(1) allows you to request a variance from the Department of Ecology when strict compliance with state well construction standards is impractical. The variance request must propose comparable alternative specifications that will provide equal or greater human health and resource protection than the minimum standards. You must apply for a variance in writing and receive approval before constructing or decommissioning the well. (All fields must be completed.)

Requested by: Martin Gardner

Mailing Address: 2345 Stevens Drive City Richland State WA Zip 99354

Daytime Phone: 509-578-5533 Date: 10-8-2018

Property Owner (if different): US Department of Energy

Site Location: SE ¼ SE ¼ Section 2 Township 12N Range 26E ☒ E or ☐ WWM

Tax Parcel Number

Well Address: Hanford Site, 241-A Tank Farm

Well Driller/Company (if known): Kelly Olson #1217, Atkins

Check one: ☐ Water Well ☒ Resource Protection Well ☐ Dewatering Well

What construction standard cannot be met? WAC-173-160-460 - DECOMMISSIONING DIRECT PUSH BORINGS

Reason why standard cannot be met. Include site map and distances from all known potential sources of contamination if setback variance is being requested. DURING CONSTRUCTION OF RESOURCE PROTECT WELLS FOR GEOPHYSICAL LOGGING AND INSTALLATION OF RESISTIVITY PROBES, TWO INSTALLATIONS EXPERIENCED DRIVE PIPE FAILURE. THE WELLS WERE BEING CONSTRUCTED USING DIRECT PUSH TECHNOLOGY. UNABLE TO REMOVE LOWER DRIVE APE FOR DECOMMISSIONING.

Alternative construction method that will provide equal or greater protections than those provided by the minimum standard. SEE ATTACHED DECOMMISSIONING PLANS.

(Attach additional pages if necessary.) Complete and return with your site map to the appropriate regional office:

Northwest Regional Office	Southwest Regional Office	Eastern Regional Office	Central Regional Office
ATTN: Noel Philip	ATTN: John Pearch	ATTN: Mark Ader	ATTN: Avery Richardson
3190 160th Avenue SE	PO Box 47775	N 4601 Monroe	15 W Yakima Ave #200
Bellevue, WA 98008	Olympia, WA 98504	Spokane, WA 99205	Yakima, WA 98902
425-649-7044	360-407-0297	509-329-3544	509-575-2639
Fax: 425-649-7098	Fax: 360-407-0284	Fax: 509-329-3529	Fax: 509-454-7830
nphi461@ecy.wa.gov	jope461@ecy.wa.gov	made461@ecy.wa.gov	aric461@ecy.wa.gov

ECY 070-299(Revised 08-09) *If you need this document in an alternate format, please call the Water Resources Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

DEPARTMENT OF ECOLOGY State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE51459**

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: USUS Department Of Energy		Phone Number	
Mailing Address: 825 Jadwin Ave	City: Richland	State: WA	Zip Code: 99353
2. Agent (if different from above)		Phone Number	
Mailing Address	City	State	Zip Code

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	City: Hanford Site		State: WA	Zip Code	
Tax Parcel Number	Township: 12N	Range: 26E	Section: 2	¼ (within 160 acres): SE	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: RE15990 Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission

Resource Protection - $20.00 each Revised Code: 027-WEL1**-02-87-000101 How Many? 2

6. Estimated Decommission Start Date: 10/9/2018 Project Name: A-Farm Vadose Direct Push

7. Professional's License Number

8. Well Drilling Company Name: ATKINS ENERGY FEDERAL EPC INC. Phone Number

9. Well Driller Name: KELLY OLSON Driller License Number: 1217

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.

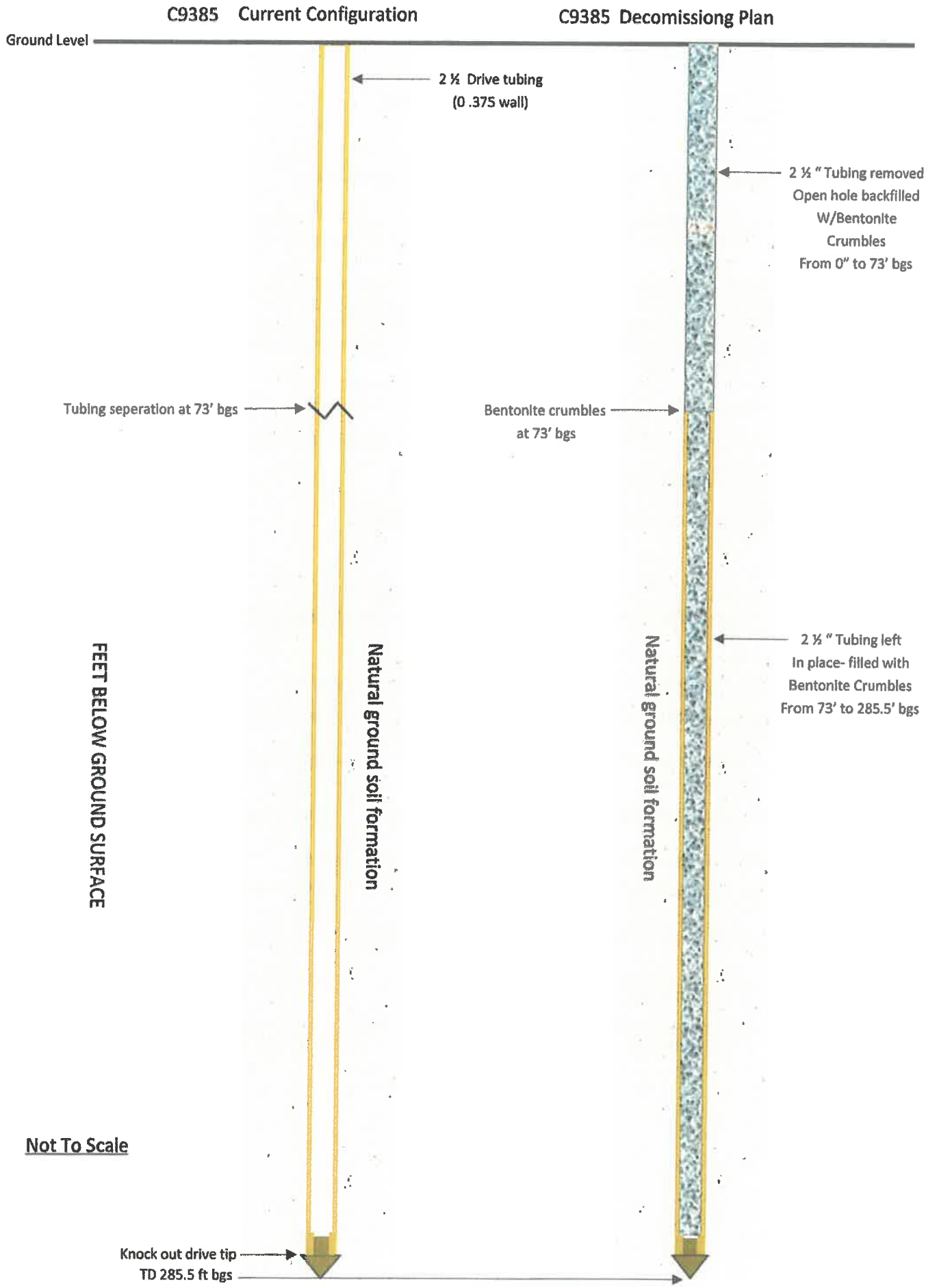
Water Well :	$50.00
Soil Sampling, Dewatering, Environmental investigation wells:	No Fee
All other wells:	$20.00 each
Amount Enclosed $	$40.00

This notification number must be provided to your driller:

AE51459

Marty.Gardner@Atkinsglobal.com

Accepted: 10/4/2018 7:56. Confirmation Number: 18100479291792. This begins your 72 hour wait period.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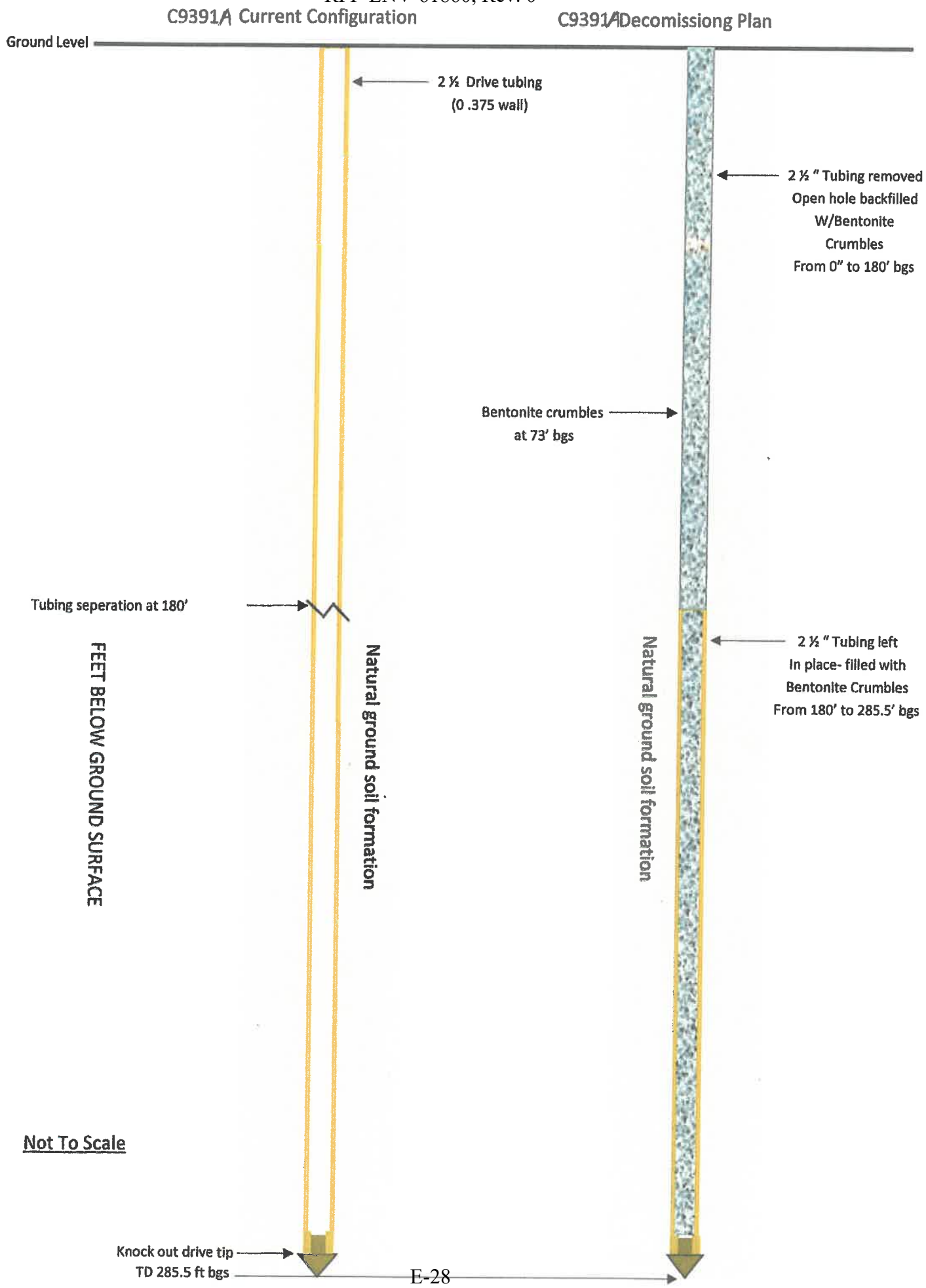
at 73' bgs
FEET BELOW GROUND SURFACE
Natural ground soil formation
Natural ground soil formation
2 ½ " Tubing left
In place- filled with
Bentonite Crumbles
From 73' to 285.5' bgs
Not To Scale
Knock out drive tip
TD 285.5 ft bgs


C9391A Current Configuration
C9391A Decomissiong Plan
Ground Level
2 ½ Drive tubing
(0 .375 wall)
2 ½ " Tubing removed
Open hole backfilled
W/Bentonite
Crumbles
From 0" to 180' bgs
Bentonite crumbles
at 73' bgs
Tubing seperation at 180'
FEET BELOW GROUND SURFACE
Natural ground soil formation
Natural ground soil formation
2 ½ " Tubing left
In place- filled with
Bentonite Crumbles
From 180' to 285.5' bgs
Not To Scale
Knock out drive tip
TD 285.5 ft bgs

ATKINS

2345 Stevens Drive, Suite 240
Richland, WA 99354
www.atkinsglobal.com/energy

May 30, 2019 005493R

Mr. Jon Lindberg
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Request for Variance to WAC 173-160-460 for Direct Push Soil Borings Supporting the Hanford Site A-Farm Vadose Investigation/Characterization, Focus Area 1.

Dear Mr. Lindberg,

Atkins Federal EPC, Inc. (Atkins), under contract to Washington River Protection Solutions (WRPS), is using direct push technology for conducting geophysical logging and soil sampling in the 241-A-Tank Farm on the Hanford Site, Washington. These direct pushes are for the characterization of A-Farm contaminate distribution in the Vadose Zone.

Five locations within the A-Farm have been selected for conducting the investigations and characterizations. A total of 10 direct push borings will be installed, two vertical and eight at various angles. At each location two direct pushes will be conducted, one for conducting geophysical logging and installation of the deep electrodes, and a second for collection of soil samples. A Request for Variance, LT-5166670-GE-0001, dated May 16, 2018, addressing these installations was submitted and approved. A Notice of Intent to Construct a Soil Boring, No.: SE66223 and Notice of Intent to Decommission a Well, No.: AE49130, were submitted for the five pushes in which soil sampling will be conducted. These Soil Borings will be decommissioned directly following completion of the soil sampling in accordance with WAC 173-160 requirements. A Notice of Intent to Construct a Resource Protection Well, No.: RE15990, was submitted for the five pushes in which Electrical Resistivity Tomography (ERT) assemblies will be installed based on a previous ERT design.

The work is ongoing, with all the logging pushes completed and only one sampling push remaining. No ERT arrays have been installed. This Request for Variance addresses the ERT design change.

The previous approved design of the ERT assemblies consisted of one eight wire lead, one single wire lead, up to nine electrodes, and three ¼ inch diameter plastic tubes bundled together. Each electrode is 2 feet in length with the bottom electrode 18 inches in length. Spacing of the electrodes is either pre-determined or based on geophysical log data. The design incorporates the installation of the plastic tubes to allow hydration of the sand pack surrounding each electrode. Each tube will be perforated with weep holes to allow for hydration of the sand pack material placed around the electrodes, with each tube servicing three electrodes. This design resulted in a Resource Protection Monitoring Well completion.
The new ERT design consists of a sheathed cable that incorporates 32 equally spaced stainless-steel mesh electrodes, each electrode is 12 inches in length. Each cable is custom designed and fitted to each borehole. This design eliminates the inclusion of the wetting tubes.

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The ERT assembly installation process will be as follows:

1. Push tubing will be driven to depth and geophysical logging conducted.
2. The expendable drive tip for the direct push tubing will be knocked out.
3. The ERT assembly will be installed within the direct push tubing
4. A custom grout mixture consisting of 32% Portland neat cement and 68% DS-325 Hess Pozzolan (ground pumice) at an approximate 0.55 water to grout ratio will be used to seal the ERT assembly in the borehole. The grout mixture will be placed by tremie method from the bottom of the borehole to surface as the direct push tubing is extracted.
5. A protective surface casing will be installed to contain the ERT lead extending from the ground at completion.

Figure 1 shows the new ERT cable and electrode configuration. Table 1 provides ERT specifications by borehole. Only four ERT arrays will be installed for Focus Area 1.

Figure 1: ERT Cable with Stainless Steel Mesh Electrode

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Table 1: ERT Specification by Borehole

Borehole ID	Borehole Total Depth (ft. of angled pipe run)	Cable Length (feet)		Electrode Spacing (feet)	Total of Electrodes
		Overall	Lead in		
C9387	295	305	26	9	32
C9391	278.7	289	25.5	8.5	32
C9393	295.1	305	26	9	32
C9395	196.8	207	19	6	32

A variance to WAC-173-160-460 for the decommissioning of environmental investigation borings utilizing direct push is requested. Specifically, the variance is for approval of the use of the custom grout mixture specified above and permanent installation of the ERT arrays for the decommissioning of the direct push investigation borings. Upon completion these boreholes will be considered as decommissioned. At the end of the useful life of the ERT, the cable will be cut off at ground surface.

Please provide your concurrence in the spaces provided below and return a copy for our project files. Please contact me at 509-942-4244 if you require additional information.

Sincerely,

Martin G Gardner

Martin Gardner
Project Manager

MGG/jil

cc: Paul Cavanah
Tracy Lippert
Richland Document Control

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
Jon Lindberg	J W Lindberg	Hydrogeologist	June 3 2019
NINA M. MENARD	Nina M. Menard	Cleanup Section Manager	6/3/19

RPP-ENV-61860, Rev. 0

DEPARTMENT OF ECOLOGY State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE56099**

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: US Department Of Energy		Phone Number	
Mailing Address: 825 Jadwin Ave	City: Richland	State: WA	Zip Code: 99353
2. Agent (if different from above)		Phone Number	
Mailing Address	City	State	Zip Code

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	City: Hanford Site		State: WA	Zip Code	
Tax Parcel Number	Township: 12N	Range: 26E	Section: 2	¼ (within 160 acres): SE	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: RE15990 — Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission
Resource Protection - $20.00 each — Revised Code: 027-WEL1**-02-87-000101 — How Many? 5

6. Estimated Decommission Start Date: 7/31/2019 — Project Name: WRPS A-Farm Focus Area 1

7. Professional's License Number

8. Well Drilling Company Name: ATKINS ENERGY FEDERAL EPC INC. — Phone Number

9. Well Driller Name: KELLY OLSON — Driller License Number: 1217

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 $	$100.00

This notification number must be provided to your driller:

AE56099

Marty.Gardner@Atkinsglobal.com

Accepted: 7/30/2019 10:18. Confirmation Number: 19073033895059. This begins your 72 hour wait period.

Instructions

Item 1: Property owner's name, daytime phone number and mailing address.

Item 2: Agent - If the driller, consultant or other person is acting as your agent and is submitting the notification fee, please provide their name, mailing address and daytime phone number

Item 3: Complete county name and code number from drop down list. If the site street address is available, please fill in the complete address here. Include city and zip code. Please enter the tax parcel number if available. NOTE: Include all dashes and zeros. Please provide the Township, Range, Section, where the well is located. This information can be found in your property legal description or the County Assessor's Office

Item 4: Please enter the original construction notice of intent number if available.

Item 5: Type of well to decommission. Please note those wells that require a fee and those that do not.

Item 6: Enter the approximate decommissioning start date.

Item 7-11: This information should be available from your well driller.

For Assistance

Contact the Department of Ecology Regional Office where the well is located.

Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima counties contact:

Central Regional Office (CRO) (509) 575-2490 TTY 711 and 1-800-833-6388

Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman counties contact:

Eastern Regional Office (ERO) (509) 329-3400 TTY 711 and 1-800-833-6388

Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom counties contact:

Northwest Regional Office (NWRO) (425) 649-7000 TTY 711 and 1-800-833-6388

Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum counties contact:

Southwest Regional Office (SWRO) (360) 407-6300 TTY 711 and 1-800-833-6388

ECY 040- 24 To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

ATKINS

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Richland, WA 99354
www.atkinsglobal.com/energy

August 28, 2019 005540R

Mr. Jon Lindberg
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Request for Variance to WAC 173-160-460 for Direct Push Resource Protection Wells Decommissioning Supporting the Hanford Site A-Farm Vadose Investigation/Characterization

Dear Mr. Lindberg,

Atkins Federal EPC, Inc. (Atkins), under contract to Washington River Protection Solutions (WRPS), is using direct push technology for conducting geophysical logging and soil sampling in the 241-A-Tank Farm on the Hanford Site, Washington. These direct pushes are for the characterization of A-Farm contaminant distribution in the Vadose Zone. The information acquired from the logging and sampling effort is intended to provide characterization information for the optimization of the installation of deep electrodes for electrical resistivity imaging. A Notice of Intent to Construct a Resource Protection Well, No.: RE15990, was submitted to the Department of Ecology (Ecology) for the five pushes in which deep electrodes will be installed. A Variance Request for the direct push work was also approved by Ecology.

The work is being performed at 5 locations within the A-Farm. At each location direct push is being used to drive tubing to target depth, and for the Resource Protection Wells, conduct geophysical logging suites and install Electrical Resistivity Probes (ERT). At the location for Well# C9391 the drive tubing was successfully driven to the target angled pipe run of 279 ft. at a dip of 30 degrees. A gyro survey of the borehole was conducted at total depth (TD). Based on the gyro data, the vertical depth at TD was 226 ft. below ground surface. Top of ground water is at approximately 287 ft. below ground surface (bgs). Geophysical logging was completed. On August 23rd the tubing was back-pulled ~4 inches to knock out the drive tip to prepare to install an ERT probe. It was discovered that the drive tubing appeared to be parted. On August 24th a camera survey was conducted and a break in the tubing was confirmed at an angled pipe run of ~ 237 ft. The push tubing is 2-1/2" outside diameter with a 1-3/4" inside diameter. Table 1 provides the Borehole Coordinates.

Table 1. A-Farm Borehole Coordinates

Borehole #	Easting	Northing	Elevation
C9391	575349.04	136102.45	210.63

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A Variance to WAC-173-160-460 for the decommissioning of Direct Push borings is being requested because the tubing left in place will not be perforated. Experience acquired from previous direct push projects performed on the Hanford Site has shown that retrieval of the lower section of parted tubing is not feasible. Efforts to retrieve parted tubing has been unsuccessful in all past efforts. The positioning of the parted tubing section in C9391 is from 194 ft to 226 ft. bgs. Top of groundwater is at 287 ft. bgs and top of the CCU_z contact is at approximately 273 ft. bgs. The proposal is to complete as planned by installing an ERT probe to total depth. An approved grout mixture will be pumped from bottom of hole to ground surface thru tremie tubing as the drive pipe is extracted, leaving the lower section of drive tubing grouted in place. The ERT placement and grout mixture was approved in a previous Variance Request (Letter #005493R). Details of the final decommissioning and ERT probe installation configuration will be documented in the Well Report.

Please provide your concurrence in the spaces provided below and return a copy for our project files. Please contact me at 942-4244 or Marty.Gardner@atkinsglobalns.com, if you require additional information.

Sincerely,

Martin Gardner
Project Manager

MGG/jil

cc: Paul Cavanah
Tracy Lippert
Richland Document Control

State of Washington, Department of Ecology Variance Concurrence/Approval:

Print Name	Signature	Title	Date
Jonathan W. Lindberg		Hydrogeologist	8/28/2019
NINA M. MENARD		Acting Section Manager	8/28/2019

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

Atkins
2345 Stevens Drive, Suite 240
Richland, WA 99354

September 10, 2019 005550R

Mr. Jon Lindberg
State of Washington
Department of Ecology
Nuclear Waste Program
Hanford Project
3100 Port of Benton Boulevard
Richland, WA 99354

Subject: Resource Protection Well Report for Hanford Site A-Farm Focus Area 1 Environmental Soil Boreholes

To Mr. Lindberg,

Attached are Resource Protection Well Report forms addressing the decommissioning of Environmental Soil Borings at 5 locations within the 241-A Tank Farm of the Hanford Site, Richland, Washington. Well construction was conducted under original Notice of Intent No. SE66223 and decommissioned under Notice of Intent No. AE49130. Construction and decommissioning were conducted in accordance with WAC-160-173 requirements and Department of Ecology approved Request for Variance. Table 1 provides a listing of Well Reports included in this submittal.

Table 1. Well Reports – A-Farm Focus Area 1 Well Reports – Environmental Sampling Boreholes

Ecology Well ID	Hanford Well ID	Start Date	Completion Date
AA0 143	C9386	11-5-18	1-10-19
AA0 138	C9388	6-25-19	7-31-19
AA0 135	C9392	4-23-19	5-8-19
AA0 136	C9394	1-31-19	4-22-19
AA0 137	C9396	3-27-19	4-14-19

If you have any questions, please contact me at 509-578-5533 or Martin.Gardner@atkinsglobalns.com.

Sincerely,

Martin Gardner
Project Manager

Atkins
2345 Stevens Drive, Suite 240
Richland, WA 99354

MGG/jil

Attachments:

1. Resource Protection Well Report for Hanford Well C9386
2. Resource Protection Well Report for Hanford Well C9398
3. Resource Protection Well Report for Hanford Well C9392
4. Resource Protection Well Report for Hanford Well C9394
5. Resource Protection Well Report for Hanford Well C9396

cc: Cynthia Tabor (WRPS)
Paul Cavanah
Tracy Lippert
Richland Document Control

DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⇨ Original NOI No. SE66223

Ecology Well ID Tag No. AA0-143

Site Well Name C9386

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE49130

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☒ Environmental Boring ☐ Other

↳ ☒ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 3 inches Casing diameter N/A inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☐ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 11/05/2018 Completed Date 1-10-2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 277 ft. bgs. After collection of the final soil sample the borehole was decommissioned. The decommissioning was accomplished with the placement of bentonite crumbles from total depth to ground surface thru tremie tube as the push rods were extracted. No surface monument was installed.	Hanford Well ID #C9386. Well is located at the Hanford Site 241-A Tank Farm. Environmental Investigation Well constructed using direct push with purpose of collecting soil samples. Soil samples were collected from pre selected locations as drive tubing was advanced. No drill cuttings produced to provide geological description.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

INSTRUCTIONS

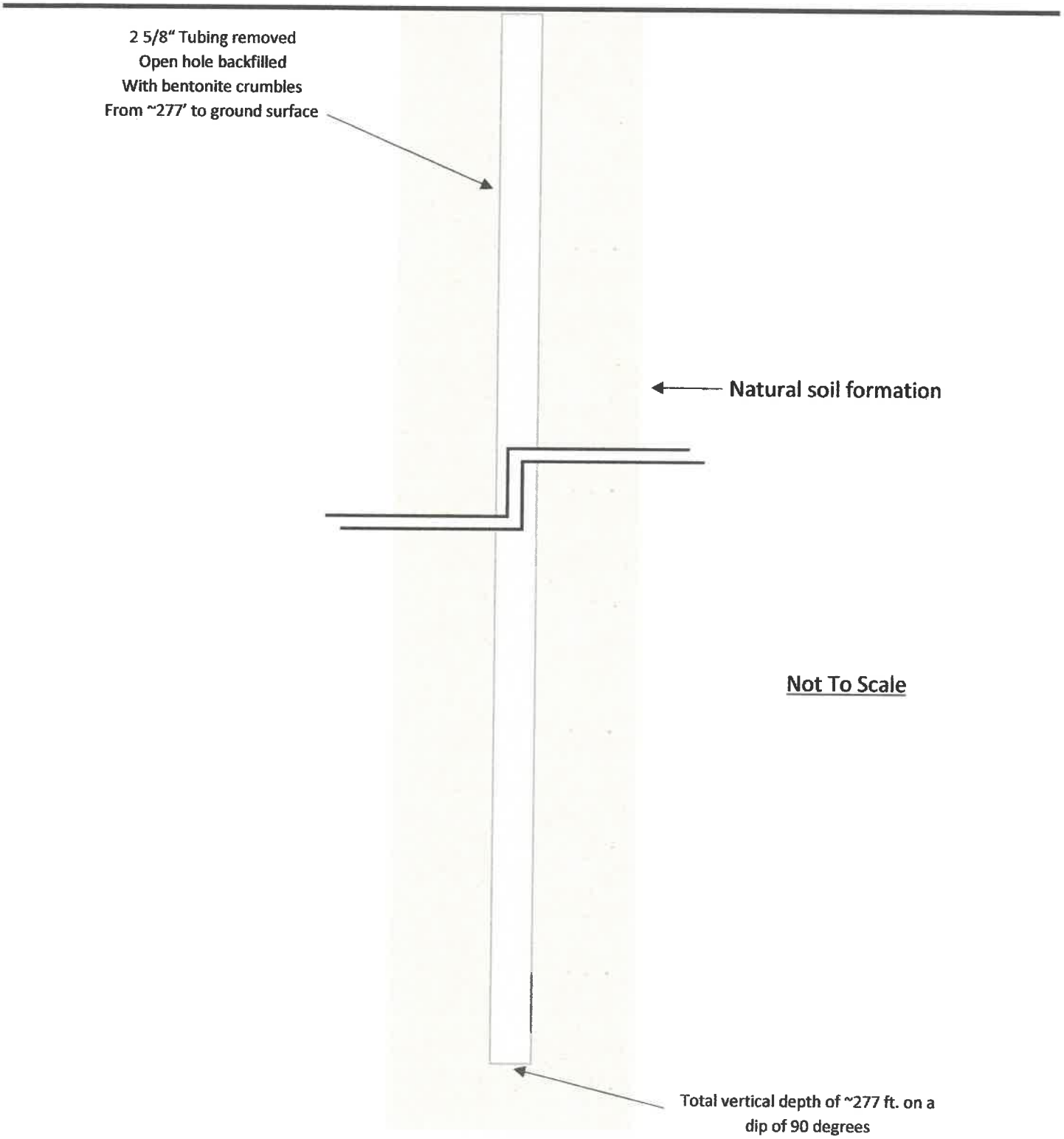
Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM]* for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Borehole C9386/AA0143 Dip 90 sample hole as built
January 10, 2019

Borehole ID/ Ecology Well ID	Borehole Total vertical Depth
C9386/AA0143	277'



DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⟹ Original NOI No. SE66223

Ecology Well ID Tag No. AA0-138

Site Well Name C9388

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE49130

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☒ Environmental Boring ☐ Other

↳ ☒ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 3 inches Casing diameter N/A inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☐ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 6/25/2019 Completed Date 7-31-19

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 187 ft. bgs. The borehole was driven on a dip of 55 degrees with a total pipe run of 292 ft. After collection of the final soil sample the borehole was decommissioned. The decommissioning was accomplished with the placement of bentonite crumbles from total depth to ground surface thru tremie tube as the push rods were extracted. No surface monument was installed.	Hanford Well ID #C9388. Well is located at the Hanford Site 241-A Tank Farm. Environmental Investigation Well constructed using direct push with purpose of collecting soil samples. Soil samples were collected from pre selected locations as drive tubing was advanced. No drill cuttings produced to provide geological description.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

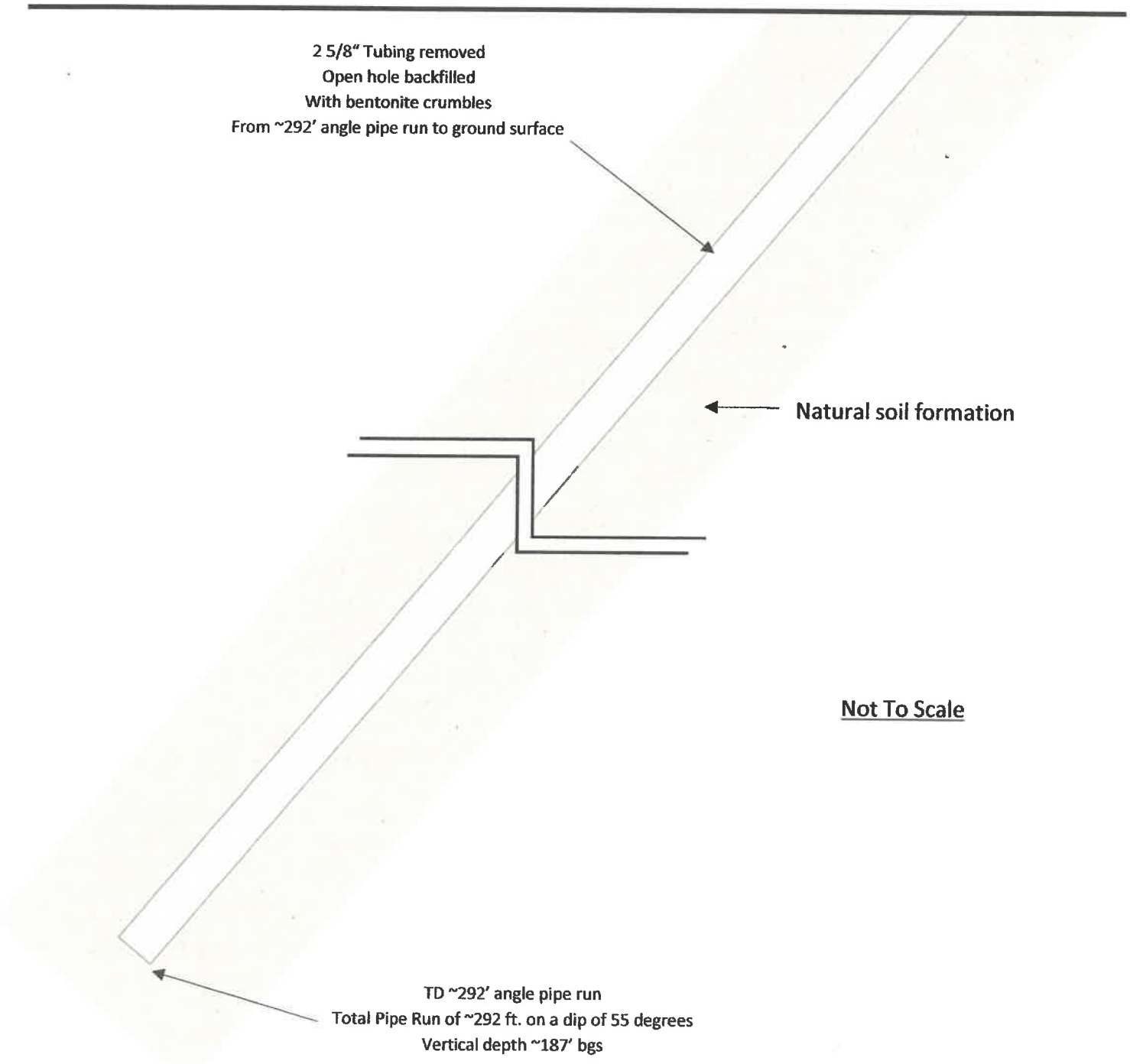
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM]* for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9388/AA0138 DIP 55 sample hole as built
July 31, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)
C9388/AA0138	292'



DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⟹ Original NOI No. SE66223

Ecology Well ID Tag No. AA0-135

Site Well Name C9392

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE49130

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☒ Environmental Boring ☐ Other

↳ ☒ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 3 inches Casing diameter N/A inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☐ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 4/23/2019 Completed Date 5/8/2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 184 ft. bgs. The borehole was driven on a dip of 60 degrees with a total pipe run of 268 ft. After collection of the final soil sample the borehole was decommissioned. The decommissioning was accomplished with the placement of bentonite crumbles from total depth to ground surface thru tremie tube as the push rods were extracted. No surface monument was installed.	Hanford Well ID #C9392. Well is located at the Hanford Site 241-A Tank Farm. Environmental Investigation Well constructed using direct push with purpose of collecting soil samples. Soil samples were collected from pre selected locations as drive tubing was advanced. No drill cuttings produced to provide geological description.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

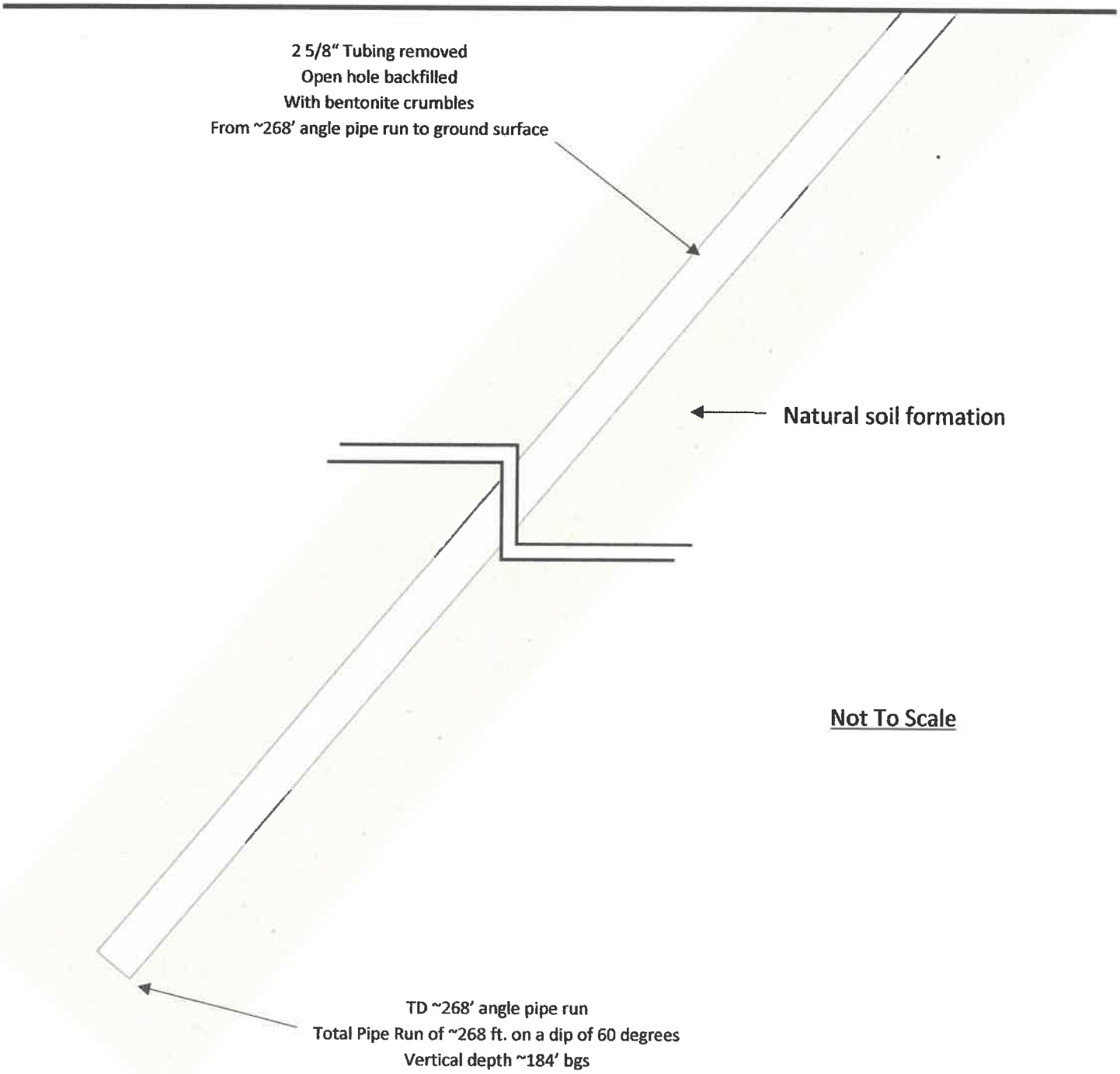
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM]* for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9392/AA0135 DIP 60 sample hole as built
May 8, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)
C9392/AA0135	268'



DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⟹ Original NOI No. SE66223

Ecology Well ID Tag No. AA0-136

Site Well Name C9394

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE49130

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☒ Environmental Boring ☐ Other

↳ ☒ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 3 inches Casing diameter N/A inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☐ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 1-31-2019 Completed Date 4-22-2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 277 ft. bgs. The borehole was driven on a dip of 75 degrees with a total pipe run of 295 ft. After collection of the final soil sample the borehole was decommissioned. The decommissioning was accomplished with the placement of bentonite crumbles from total depth to ground surface thru tremie tube as the push rods were extracted. No surface monument was installed.	Hanford Well ID #C9394. Well is located at the Hanford Site 241-A Tank Farm. Environmental Investigation Well constructed using direct push with purpose of collecting soil samples. Soil samples were collected from pre selected locations as drive tubing was advanced. No drill cuttings produced to provide geological description.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

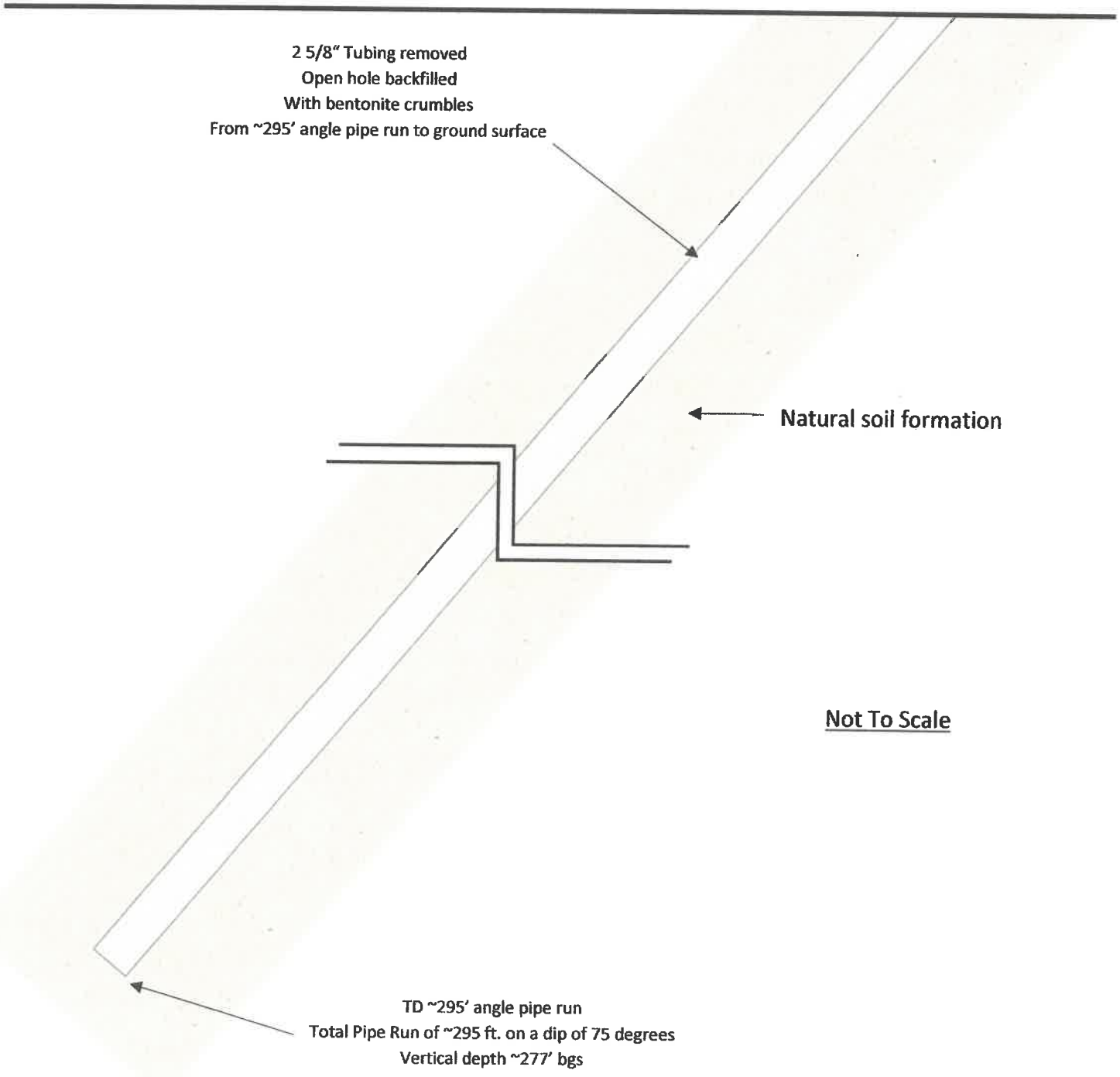
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM]* for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9394/AA0136 DIP 75 sample hole as built
April 22, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)
C9394/AA0136	295'



DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⟹ Original NOI No. SE66223

Ecology Well ID Tag No. AA0-137

Site Well Name C9396

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE49130

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☒ Environmental Boring ☐ Other
↳ ☒ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 3 inches Casing diameter N/A inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☐ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 3/27/2019 Completed Date 4-14-2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 113 ft. bgs. The borehole was driven on a dip of 45 degrees with a total pipe run of 178 ft. After collection of the final soil sample the borehole was decommissioned. The decommissioning was accomplished with the placement of bentonite crumbles from total depth to ground surface thru tremie tube as the push rods were extracted. No surface monument was installed.	Hanford Well ID #C9396. Well is located at the Hanford Site 241-A Tank Farm. Environmental Investigation Well constructed using direct push with purpose of collecting soil samples. Soil samples were collected from pre selected locations as drive tubing was advanced. No drill cuttings produced to provide geological description.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

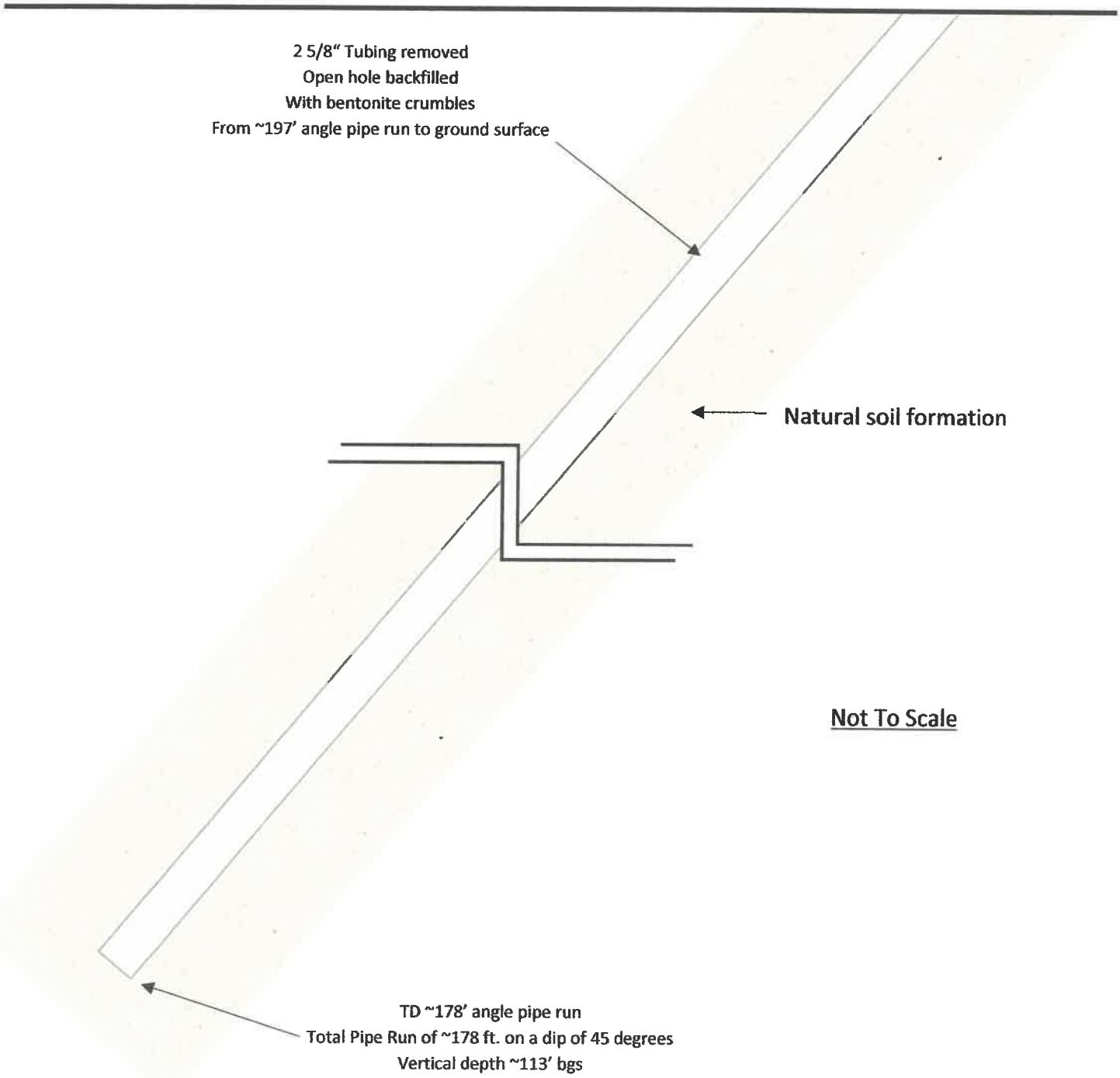
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM*] for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9396/AA0137 DIP 45 sample hole as built
April 14, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)
C9396/AA0137	178'



SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

Atkins
2345 Stevens Drive, Suite 240
Richland, WA 99354

September 10, 2019 005549R

Mr. Jon Lindberg
State of Washington
Department of Ecology
Nuclear Waste Program
Hanford Project
3100 Port of Benton Boulevard
Richland WA 99354

Subject: Resource Protection Well Report for Hanford Site A- Farm Focus Area 1 Instrumentation Wells

To Mr. Lindberg,

Attached are Resource Protection Well Report forms addressing the installation of Instrumentation Wells at 4 locations within the 241-A Tank Farm of the Hanford Site, Richland, Washington. Well construction was conducted under original Notice of Intent No. RE15990 and decommissioned under Notice of Intent No. AE56099. Construction was conducted in accordance with WAC-160-173 requirements and Department of Ecology approved Requests for Variance. With the completion of the instrument installation process, these wells are now considered decommissioned. Table 1 provides a listing of Well Reports included in this submittal.

Table 1. Well Reports – A-Farm Focus Area 1 Well Reports - Instrumentation Wells

Ecology Well ID	Hanford Well ID	Start Date	Completion Date
AA0 139	C9387	5-9-19	8-13-19
AA0 140	C9391	1-14-19	8-29-19
AA0 141	C9393	9-4-19	8-22-19
AA0 142	C9395	10-15-18	6-25-19

If you have any questions, please contact me at 509-578-5533 or Martin.Gardner@atkinsglobalns.com.

Sincerely,

Martin Gardner
Project Manager

Atkins
2345 Stevens Drive, Suite 240
Richland, WA 99354

MGG/jil

Attachments:

1. Resource Protection Well Report for Hanford Well C9387
2. Resource Protection Well Report for Hanford Well C9391
3. Resource Protection Well Report for Hanford Well C9393
4. Resource Protection Well Report for Hanford Well C9395

cc: Cynthia Tabor (WRPS)
Paul Cavanah
Tracy Lippert
Richland Document Control

DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⟹ Original NOI No. RE15990

Ecology Well ID Tag No. AA0-139

Site Well Name C9387

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth. Decommissioned leaving Electrical Resistivity Probe installed. No further actions or reporting required.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number: _____

Sponsor's signature _____

Notice of Intent No. AE56099

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☐ Environmental Boring ☒ Other Instrumentation Well
↳ ☐ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 2.5 inches Casing diameter 2.5 inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☒ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 5/9/2019 Completed Date 8/13/2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 217 ft. bgs. on a dip of 55 degress resulting in a total pipe run of 298 ft. At total depth the drive tip was knocked out of the tip holder. Electrical Resistivity Probes (ERT) were installed and grouted in place thru tremmie tube from bottom to surface as the drive tubing was extracted. A protective casing was installed flush to ground surface to protect the ERT cable extending from the ground. The attached well completion diagram shows the ERT installation design details. The grout mixture was approved by Ecology in a Variance Request. Well is considered decommissioned.	Hanford Well ID #C9387. Well is located at the Hanford Site 241-A Tank Farm. Well constructed using direct push. Geophysical logging was conducted at total depth. No soil samples were collected.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

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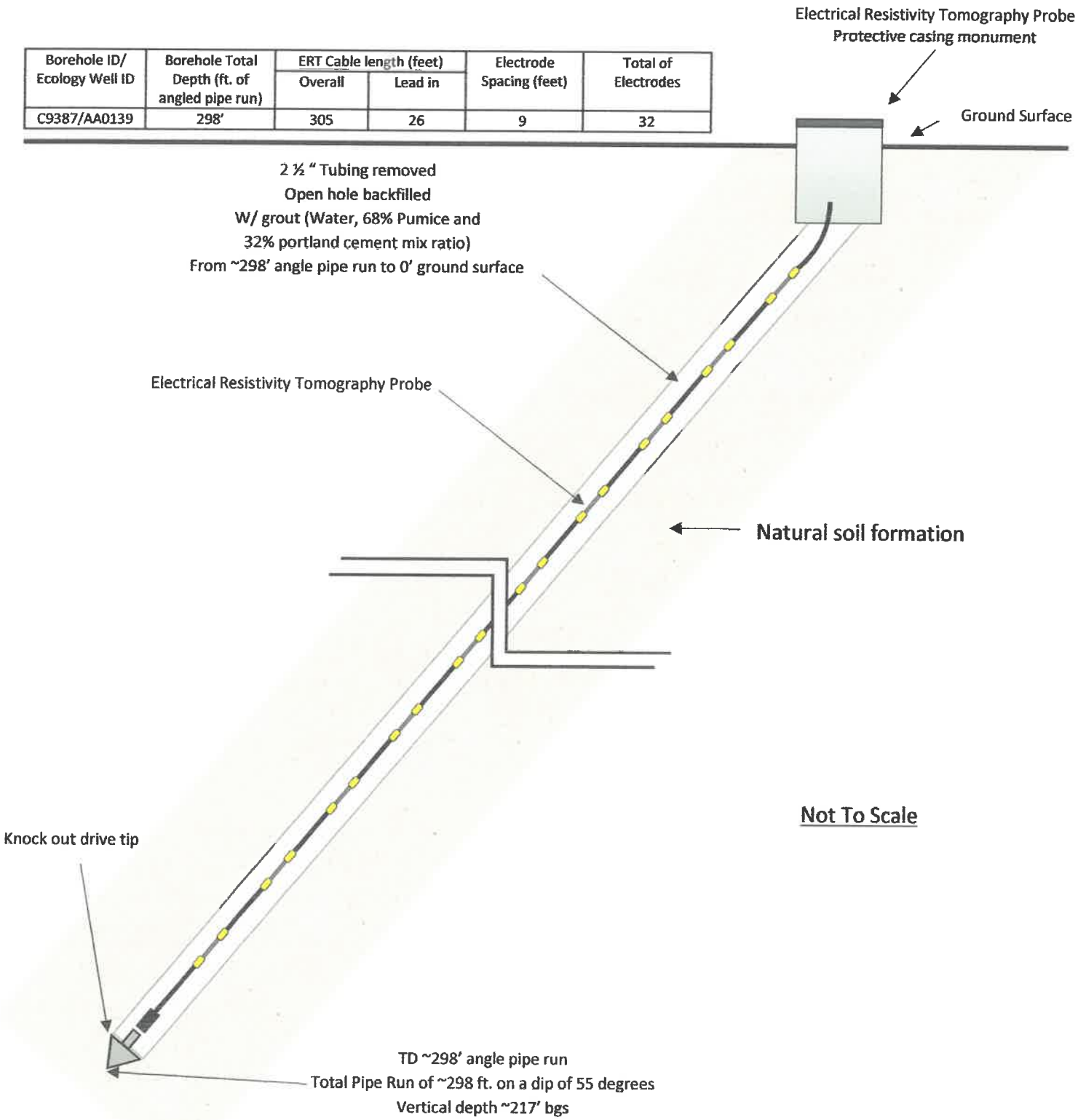
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM]* for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9387/AA0139 DIP 55 ERT (Electrical Resistivity Tomography probe) as built
August 13, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)	ERT Cable length (feet)		Electrode Spacing (feet)	Total of Electrodes
		Overall	Lead in		
C9387/AA0139	298'	305	26	9	32



DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⟹ Original NOI No. RE15990

Ecology Well ID Tag No. AA0-140

Site Well Name C9391

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth. Decommissioned leaving Electrical Resistivity Probe installed. No further actions or reporting required.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE56099

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☐ Environmental Boring ☒ Other Instrumentation Well
↳ ☐ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 2.5 inches Casing diameter 2.5 inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☒ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 1-14-2019 Completed Date 8-29-2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 225 ft. bgs. on a dip of 60 degress resulting in a total pipe run of 279 ft. Tubing parted at 194 ft. bgs (237 ft. pipe run). Electrical Resistivity Probes (ERT) were installed and grouted in place thru tremmie tube from bottom to surface as the drive tubing was extracted. The parted tubing from from 194-226 ft. bgs. (237'-279' angled pipe run) was left in place. A protective casing was installed flush to ground surface to protect the ERT cable extending from the ground. The attached well completion diagram shows the ERT installation design details. Variance Requests approved for ERT installation and Decommissioning leaving parted tubing in place. Well is considered decommissioned..	Hanford Well ID #C9391. Well is located at the Hanford Site 241-A Tank Farm. Well constructed using direct push. Geophysical logging was conducted at total depth. No soil samples collected.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

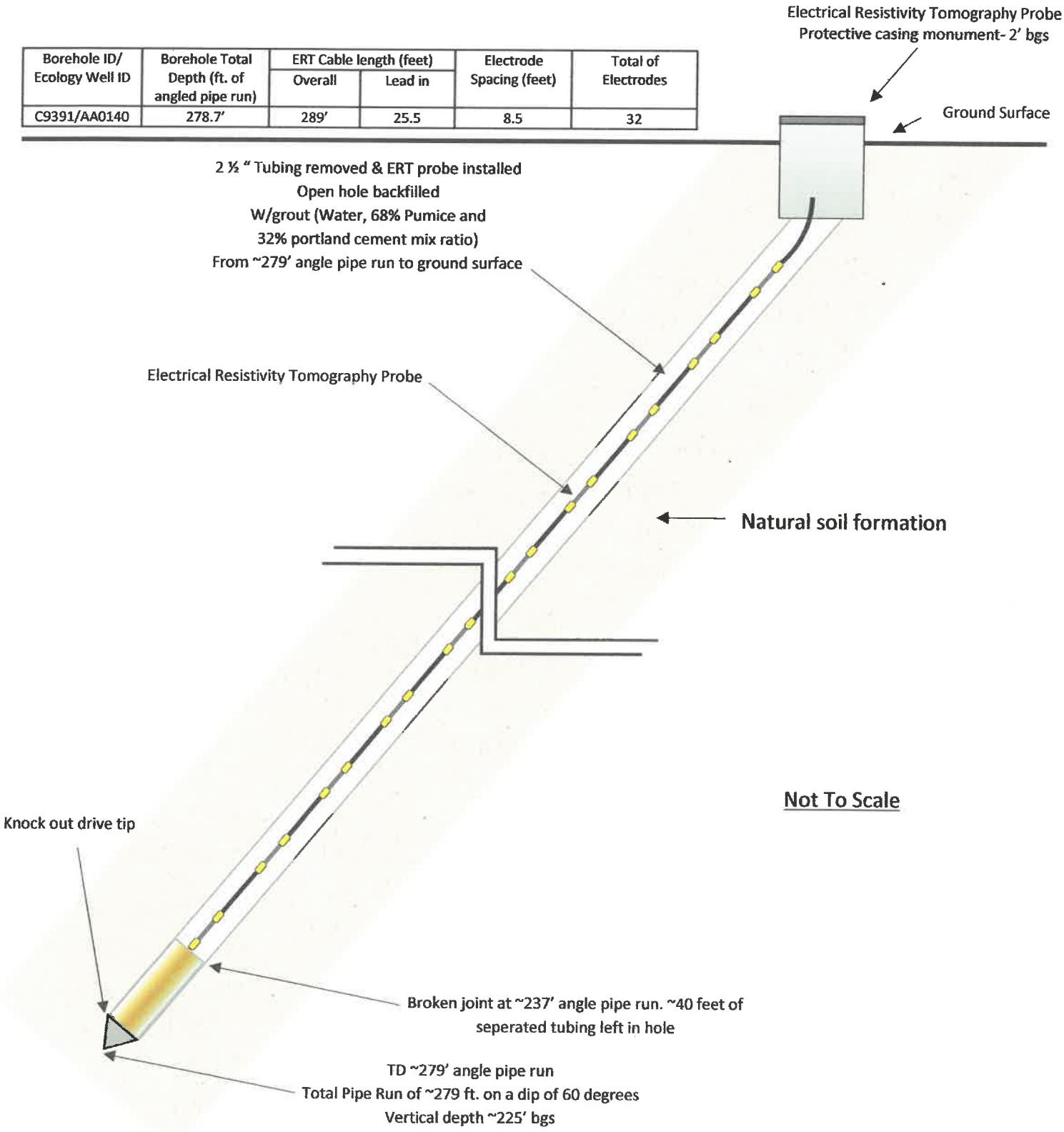
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM*] for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9391/AA0140 DIP 60 ERT (Electrical Resistivity Tomography probe) as built
August 29, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)	ERT Cable length (feet)		Electrode Spacing (feet)	Total of Electrodes
		Overall	Lead in		
C9391/AA0140	278.7'	289'	25.5	8.5	32



DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⟹ Original NOI No. RE15990

Ecology Well ID Tag No. AA0-141

Site Well Name C9393

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth. Decommissioned leaving Electrical Resistivity Probe installed. No further actions or reporting required.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE56099

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☐ Environmental Boring ☒ Other Instrumentation Well
↳ ☐ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 2.5 inches Casing diameter 2.5 inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☒ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 9/04/2018 Completed Date 8/22/2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 270 ft. bgs. on a dip of 75 degress resulting in a total pipe run of 295 ft. At total depth the drive tip was knocked out of the tip holder. Electrical Resistivity Probes (ERT) were installed and grouted in place thru tremmie tube from bottom to surface as the drive tubing was extracted. A protective casing was installed flush to ground surface to protect the ERT cable extending from the ground. The attached well completion diagram shows the ERT installation design details. The grout mixture was approved by Ecology in a Variance Request. Well is considered decommissioned.	Hanford Well ID #C9393. Well is located at the Hanford Site 241-A Tank Farm. Well constructed using direct push. Geophysical logging was conducted at total depth. No soil samples were collected.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

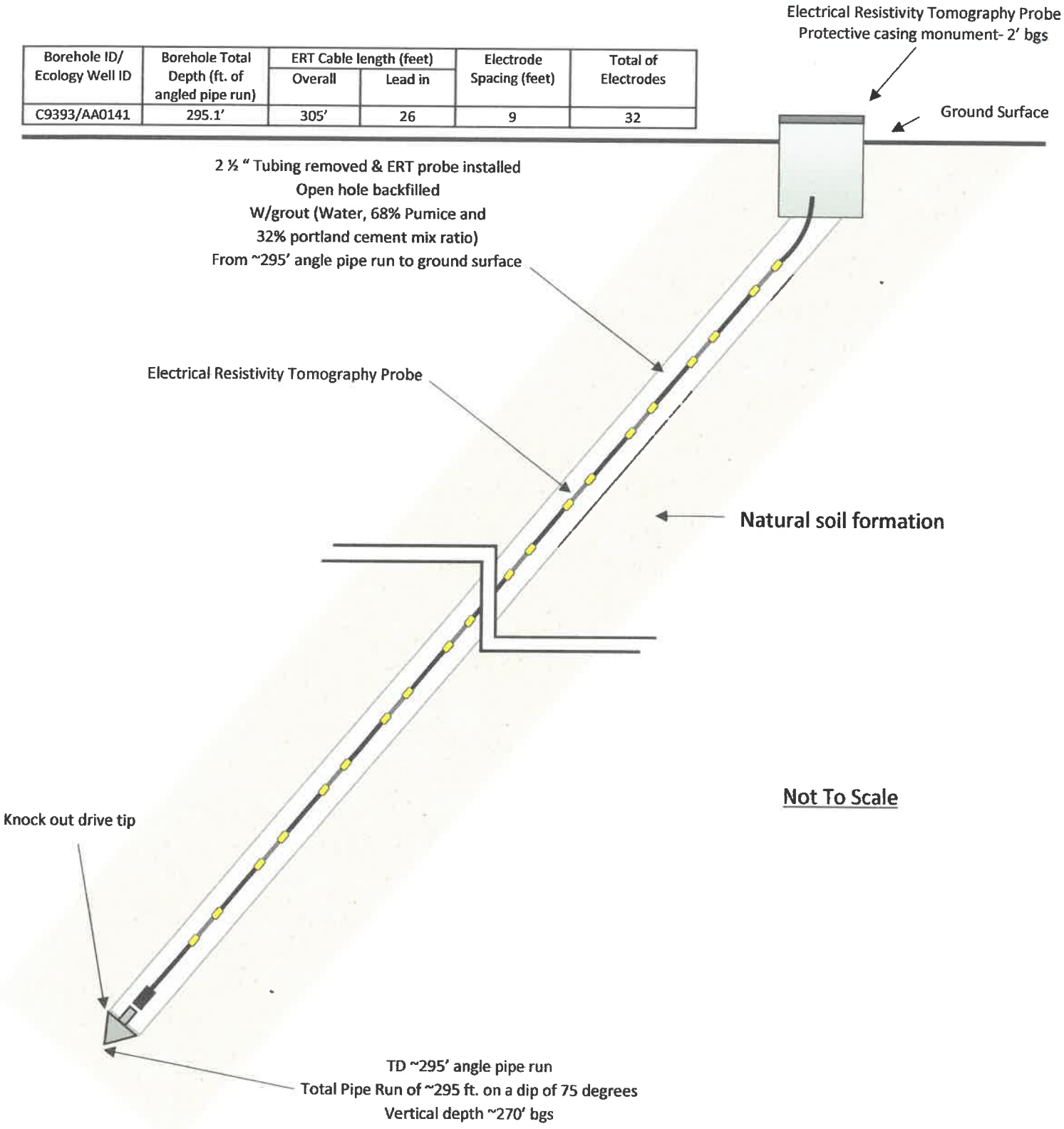
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM*] for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9393/AA0141 DIP 75 ERT (Electrical Resistivity Tomography probe) as built
August 22, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)	ERT Cable length (feet)		Electrode Spacing (feet)	Total of Electrodes
		Overall	Lead in		
C9393/AA0141	295.1'	305'	26	9	32



DEPARTMENT OF ECOLOGY State of Washington

Resource Protection Well Report

Submit one well report per well installed. See page two for instructions.

Type of Work:

☐ Construction
☒ Decommission ⇨ Original NOI No. RE15990

Ecology Well ID Tag No. AA0-142

Site Well Name C9395

Consulting Firm

Was a variance approved for this well/boring? ☒ Yes ☐ No

If yes, what was the variance for? Direct Push borehole greater than 30 ft. in depth. Decommissioned leaving Electrical Resistivity Probe installed. No further actions or reporting required.

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 are true to my best knowledge and belief.

☒ Driller ☐ Trainee ☐ Engineer

Name (Print Last, First Name) Olson, Kelly

Driller/Engineer/Trainee Signature Kelly Olson

License No. 1217

Company Name Atkins

If trainee box is checked, sponsor's license number:

Sponsor's signature

Notice of Intent No. AE56099

Type of Well:

☐ Resource Protection Well ☐ Injection Point
☐ Remediation Well ☐ Grounding Well
☐ Geotechnical Soil Boring ☐ Ground Source Heat Pump
☐ Environmental Boring ☒ Other Instrumentation Well
↳ ☐ Soil- ☐ Vapor- ☐ Water-sampling

Property Owner US Department of Energy

Well Street Address 825 Jadwin Ave

City Richland County Benton

Tax Parcel No.

Location (see instructions): WWM ☐ or EWM ☒

SE ¼-¼ SE ¼, Section 2 Town 12N Range 26E

Latitude (Example: 47.12345)

Longitude (Example: -120.12345)

(WGS 84 Coordinate System)

Borehole diameter 2.5 inches Casing diameter 2.5 inches

Static water level N/A ft below top of casing Date N/A

☐ Above-ground completion with bollards ☒ Flush monument

↳ Stick-up of top of well casing _____ ft above ground surface

ECY050-12 (07/2018) To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Start Date 10/15/2018 Completed Date 6/25/2019

Construction Design	Well Data	Driller's Log
See attached well completion diagram. Tubing was driven to a total depth of 126 ft. bgs. on a dip of 45 degress resulting in a total pipe run of 197 ft. At total depth the drive tip was knocked out of the tip holder. Electrical Resistivity Probes (ERT) were installed and grouted in place thru tremmie tube from bottom to surface as the drive tubing was extracted. A protective casing was installed flush to ground surface to protect the ERT cable extending from the ground. The attached well completion diagram shows the ERT installation design details. The grout mixture was approved by Ecology in a Variance Request. Well is considered decommissioned.	Hanford Well ID #C9395. Well is located at the Hanford Site 241-A Tank Farm. Well constructed using direct push. Geophysical logging was conducted at total depth. NO soil samples were collected.	N/A

RESOURCE PROTECTION WELL CONSTRUCTION PROCESS

After a well is constructed, modified or decommissioned, a well report must be filed within 30 days to the Department of Ecology. Well reports are completed by the person who constructed the well. This is typically a Washington State licensed well operator.

This well report form is used for resource protection wells and borings as indicated on the *Type of Well* section on page 1. Ecology also offers a web-based well reporting option for environmental investigation and geotechnical soil borings. Visit our website to learn more about the Well Report Gateway.

Below are the instructions for filling out this well report. After the form has been printed and filled out, it should be mailed to the Department of Ecology regional office responsible for the area the well work was conducted.

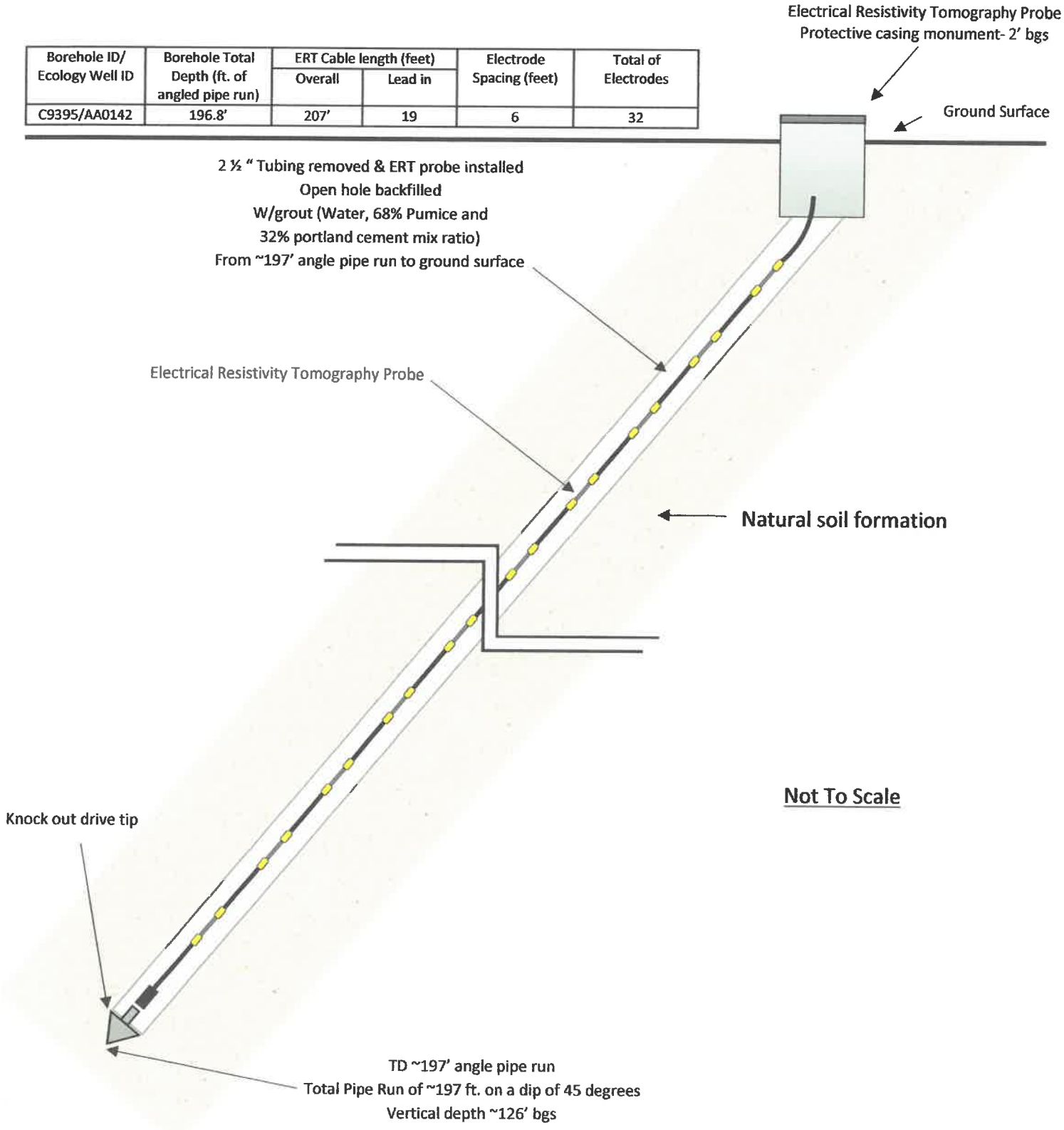
INSTRUCTIONS

Type of Work: Construction/Decommission – This form is used for BOTH construction and decommissioning of a well. Please check the appropriate box. For decommissioning – enter the original construction Notice of Intent No. here (if available).
Ecology Well ID Tag No. – The number issued by the Department of Ecology that is stamped on a metal tag that is attached to the actual well. (e.g., AAA-000)
Site Well Name (if more than one well): If there is more than one well on the site, you may identify each well with a site well name or number and place it in this space. This is different from the Ecology Well ID Tag Number.
Consulting Firm – Which consulting firm managed the project?

Was a variance approved? – A variance request is submitted to a regional well coordinator if the regulations cannot be met. Explain the request here.
Well Construction Certification – Read the statements; enter the Driller and Drilling Company information; sign and date in the blanks provided.
Notice of Intent No. – The number issued by the Department of Ecology for tracking purposes (e.g., RE12345). Should start with an R, G, S, E or A for this form.
Type of Well – Check the appropriate box. An example of an *Other* well is a vibrating wire piezometer or instrumentation well. You can check more than one environmental boring type.
Property Owner Name – The person or business that owns the property.
Well Street Address – The physical address where the well is located. (Note: NOT the mailing address.)
City – City where the well is located.
County – County where the well is located.
Tax Parcel No. – County tax parcel number - enter *ROW* for right-of-way.
Location – The quarter-quarter, quarter, section, township and range (TRS) of the well. For example: the SE ¼-¼ of the NE ¼, S10, T20N, R05 – check box for East or West of the Willamette Meridian [*EWM/WWM]* for range. The web-based State Well Report Viewer in *map view* is one of the best places to determine well location using the TRS system.
Latitude/Longitude – Using a GPS or web-derived (Google Maps, Bing Maps, etc.) coordinates, enter the latitude and longitude of the well. Use the WGS84 coordinate system.
Borehole Diameter – The size of the bit used while drilling, in inches.
Casing Diameter – The nominal size of the installed casing, in inches.
Static water level – The depth in feet to water surface inside the well or boring, preferably to the hundredth (ie. 6.78 ft). A *static* water level implies the measurement is not disturbed by pumping or drilling. Include the date the measurement was taken.
Casing Stick-up – Indicate the distance in feet the casing rises above ground surface, preferably to the hundredth (ie. 2.34 ft).
Construction Design – Draw a schematic of the well construction design.
Well Data – Explain the materials used and installation depths from the Construction Design section.
Driller's Log – Describe the thickness and composition of geologic materials, water bearing strata, or other details noted while drilling. Also, decommissioning procedures and additional location information can be written here.

Borehole C9395/AA0142 DIP 45 ERT (Electrical Resistivity Tomography probe) as built
July 7, 2019

Borehole ID/ Ecology Well ID	Borehole Total Depth (ft. of angled pipe run)	ERT Cable length (feet)		Electrode Spacing (feet)	Total of Electrodes
		Overall	Lead in		
C9395/AA0142	196.8'	207'	19	6	32



APPENDIX F

GEOPHYSICAL LOGGING RESULTS FOR WMA A-AX FOCUS AREA 1 (TANKS 241-A-104 AND 241-A-105)

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Geophysical Logging in the A-Tank Farm, Focus Area 1

by

Russ Randall, PhD

To

Atkins Energy Federal EPC, Inc.

Richland, Washington 99354

February 2020

Three Rivers Scientific

3740 Grant Loop

West Richland, Washington 99353

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LIST OF ACRONYMS

ASCII	American Standard Code for Information Interchange
BGO	Bismuth Germanium Oxide
bgs	below ground surface
CeBr	Cerium Bromide
cps	counts per second
eRa	equivalent radium
ERT	Electrical Resistivity Tomgraphy
ft bgs	feet below ground surface
FT	Foot
HE	High Efficiency
HER	High Energy Resolution
HPGe	High Purity Germanium
ID	Identification
IR	Infrared
KeV	Kilo electrotro Volts
KUT	Potassium, Uranium, and Thorium
µCi	Micro Curies
MCNP	Monte Carlo Neutron Progression
ms	micro second
NA	Non-Applicable
NIST	National Institute of Standards and Technology
pCi/g	pico Curies per gram
RSICC	Radiation Safety Information Computational Center
WMA	Waste Management Area

1.0 INTRODUCTION

Atkins Energy Federal EPC, Inc. and Three Rivers Scientific, LLC provided small diameter (direct push) gyroscope deviation and geophysical logging in support of field activities in the area around Tank 241-A-104 (A-104) and Tank 241-A-105 (A-105) in Waste Management Area (WMA) A-AX (Focus Area 1). Gyroscope data were collected from nine angle direct pushes, which included four logging pushes, four sampling pushes, and one failed logging push. Geophysical logging obtained from five direct pushes included gamma, moisture, and temperature data. Data from the logging pushes were used to assist with identifying areas to sample in the corresponding sample push. Table 1 provides a summary of data collected at WMA A-AX Focus Area 1.

The Washington State plane coordinates for the 11 direct pushes are provide in Appendix H of this completion report. Logging pushes are assigned an odd number identification (ID) (e.g., C9391), and the sampling pushes are assigned even number ID (e.g., C9392).

This report includes the coordinate location information of sensors deployed in four angled pushes, coordinate location information for samples collected at four angled sampling pushes, geophysical logging results from five direct pushes, and calibration certificates. This information is included in the following Attachments:

- Attachment A, Sample and ERT Location Information Based on Gyroscope Results
- Attachment B, Geophysical, Temperature, and Gyroscope Logging Results
- Attachment C, Calibration Certificates

Table 1. Summary of Data Collected for WMA A-AX Focus Area 1

Direct Push ID	Confirmation of Trajectory Gyroscope Logging Depth (ft pipe run)	Gyroscope Logging Total Depth (ft pipe run)	KUT, Temperature, Moisture, Total Gamma, and Cesium-137 Logging Performed
C9385[a] (vertical, logging)	NA	NA	Yes
C9386[a] (vertical, sampling)	NA	NA	No
C9387 (angle, logging)	26.0 and 58.0	294.5	Yes
C9388 (angle, sampling)	26.0 and 59.0	291.0	No
C9391 (angle, logging)	51.0	278.0	Yes
C9391A[b] (angle, logging)	45.0	Not Logged	No
C9392 (angle, sampling)	54.0	266.0	No
C9393 (angle, logging)	45.0	292.0	Yes
C9394 (angle, sampling)	47.5	295.0	No
C9395 (angle, logging)	45.0	197.0	Yes

Table 1. Summary of Data Collected for WMA A-AX Focus Area 1

Direct Push ID	Confirmation of Trajectory Gyroscope Logging Depth (ft pipe run)	Gyroscope Logging Total Depth (ft pipe run)	KUT, Temperature, Moisture, Total Gamma, and Cesium-137 Logging Performed
C9396 (angle, sampling)	46.0 and 66.0	177.0	No

a. Vertical direct push, gyroscope logging was not performed at this location.
b. Due to broken tubing, unable to perform KUT logging or gyroscope logging of total depth. This location was replaced by C9391.
ID = identification
KUT = background gamma activity from potassium-40, uranium-238, and thorium-232
NA = not applicable

Performance of direct push at an angle required the use of directional control of the angle pushes. It also required the use of a gyroscope for tracking the subsurface path of the tubing and for documenting the precise northing, easting, and elevation of sampling performed during angle pushes. Table 2-1 in the completion report describes the planned and final measurements of the WMA A-AX Focus Area 1 direct pushes. See Tables A1 through A4 in Attachment A for angle direct push sample-related location information. Sample depth information for vertical direct push C9386 is included in the completion report (Table 2-2). Electrical resistivity tomography (ERT) sensors were installed in the four angle direct pushes (i.e., C9387, C9391, C9393, and C9395 – Refer to Tables A5 and A6 in Attachment A).

Geophysical and gyroscope logging were performed from the bottom of the direct push to the ground surface (i.e., zero depth reference). For angle pushes, initial measurements were reported in feet (ft) of pipe run from ground surface then converted to ft below ground surface (bgs) after completion of the gyroscope logging. A daily repeat measurement was acquired to verify the geophysical logging instrument repeatability. The main geophysical 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. Logging results for each direct push are presented in Attachment B. The geophysical logging plots are in numeric order of the direct push IDs: C9385, C9387, C9391, C9393, and C9395. Gyroscope logging results for all angle pushes (logging and sampling holes) are also provided in Attachment B (C9387/C9388, C9391/C9392, C9393/C9394, C9395/C9396), after each locations geophysical logging information.

Hoist calibrations were performed using a deep well (699-48-77A) to collect the data (certificates located in Attachment C). Initial analysis of the deeper data showed a line stretch effect for the plastic coated cable. More data were collected and analyzed to produce a line stretch connection to be calculated after normal logging operations. All direct push log data sets had this line stretch error. Therefore, the WMA A-AX logs were reanalyzed to correct for this line stretch. Attachment B contains the reanalyzed logs. Depths reported for the geophysical and the gyroscope logs were taken directly from the depths recorded by the computer from the depth encoder. These depths may not match exactly with the pipe run depths as measured by the driller.

2.0 LOGGING EQUIPMENT

Logging was conducted with three detectors: bismuth germanium oxide (BGO) and cerium bromide (CeBr) (both scintillation), and a neutron moisture tool. The BGO and CeBr detectors were run in combination during the logging run, and spectral gamma data were recorded for both. The High Energy Resolution (HER) gamma CeBr detector was used because the energy resolution is better than the BGO detector. The CeBr detector analyzed for species and concentrations of radionuclides in soil adjacent to the direct push. The High Efficiency (HE) gamma BGO detector was used with only modest energy resolution but superior gamma detection efficiency. This detector analyzed for gross gamma and KUT concentrations. KUT refers to the naturally occurring isotopes of potassium-40, uranium-238, and thorium-232. The concentrations of these naturally occurring isotopes can be used to infer the geologic conditions of the vadose zone near the direct pushes. The neutron moisture tool is used to analyze for volume % moisture of the surrounding soils. This instrument uses a neutron source housed within the tool and a thermal neutron detector also housed within the tool.

The logging system is a portable unit powered by either an on-site generator (120V AC), or site-supplies power. A laptop computer allocated to the logging unit was used to monitor encoder depth positions, control the winch monitor, and record detector responses.

2.1 GROSS GAMMA LOGGING AND CALIBRATION

The gross gamma is obtained using the efficiency superior BGO 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 nominal 1 µCi cobalt-60 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 Hanford Site near Richland, Washington. Calibration data were collected in the two most appropriate (lowest concentration) gross gamma calibration models designated as SBA and SBU. The detector was covered with a 2 ft long section of the push tubing (0.37-in. thick) to mimic logging conditions in the push. The calibration data are summarized in Table 2. The calibration units are pCi/g of equivalent radium-226 (eRa-226). See Attachment C for the calibration certificates.

Table 2. Gross Gamma Calibration Data

Calibration Model Designation	Concentration eRa-226 (pCi/g)
SBA	61.2
SBU	185.0

The BGO/CeBr gamma logging were logged at 0.5 ft depth increments and 100 seconds per increment. A spectrum of 1024 channels was collected each 0.5 ft from the bottom of the push to the surface. The spectra were recorded in comma delimited format with all spectra per file. Detector cound rates were dead-time corrected and the gamma logging results 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 noparalyzable relationship (Knoll, 1979) and described by the following equation:

$$C_t = \frac{C_{obs}}{1 - \varepsilon \cdot C_{obs}}$$

Where C_t is the true or dead-time corrected count rate in counts per second (cps), C_{obs} is the observed count rate in cps, and ε is the dead-time factor of 1.8 µs.

2.2 SPECTRAL GAMMA LOGGING AND CALIBRATION

Calibration of the BGO logging system was performed in the four spectral gamma borehole calibration models located at the Hanford Site near Richland, Washington and according to Hanford Site procedures for scintillation type spectral gamma ray borehole detectors (Randall & Stromswold). The four calibration models contain elevated concentrations of naturally occurring radionuclides (KUT). The radionuclide concentrations are tracable to National Institute of Standards and Technology (NIST) standards (Steele & George). Table 3 lists the radionuclide concentration in each of the gamma calibration models. The uncertainty is quoted as the 2-sigma (95%) confidence level. See Attachment C for the calibration certificates.

Table 3. Hanford Calibration Model Values for KUT

Calibration Model Designation	Potassium-40 (pCi/g)	Radium-226 (pCi/g)	Thorium-232 (pCi/g)
SBK	53.5	1.16	0.11
SBU	10.72	190.52	0.66
SBT	10.63	10.02	58.11
SBM	41.78	125.79	39.12

Calibration was performed with a section of the steel drill tubing (2 ft long) (0.37-in. thick [2.5-in. outer diameter]) installed over detector (4-in. long) during calibration measurements. Performing the calibration with the casing installed over the detector is more rigorous than performing the calibration in an open hole and later applying a casing correction to the hole logging.

During logging, the gamma peak at 1461 keV from potassium-40 is almost always present as the dominant peak in each spectra. The second best peak is the 2614 keV peak from thorium-232. Both of these leaks are used to monitor for spectra gain changes. During data processing the spectra gain is adjusted to track the reference gamma peaks.

Spectra (100 seconds each) logging was performed and measured every 0.5 ft between the selected depth intervals in a move-stop-acquire logging mode. The results are presented on the plot for each logging push.

2.3 CERIUM BROMIDE SPECTRAL PHOTO PEAK LOGGING AND CALIBRATION

The CeBr spectral data are processed differently than the BGO data, and thus the CeBr calibration is different. The CeBr calibration is performed in the same manner that the high purity Germanium (HPGe) log data are calibrated (Randall) and log data processed. 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 cesium-137 (661 keV), but the same technique can be applied to any other gamma ray.

The SBU calibration model was used to measure the CeBr detector efficiency for the 609 keV peak from a daughter product of uranium-238. The gamma ray detection efficiency of CeBr is a function of energy, thus a method of correcting the measured efficiency at 609 to the efficiency at 661 keV was developed. The Monte Carlo Neutron Progression (MCNP) code developed by the Radiation Safety Information Computational Center (RSICC) 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 cesium-137 gamma ray efficiency. The tool geometry of the modeling was the same used in the SBU calibration, and the source was set to both 609 and 661 keV distributed throughout an SBU matrix.

The dead-time for the CeBr instrument was measured to be 1.065 µs. The measurement adjusted detector efficiency for the 661 keV is 0.689 cps per pCi/g. The measured Full Width at Half Mass % (FWHM) for the cesium-137 photo peak is 5.7% at 661 keV. See Attachment C for the calibration certificates.

The log data processing for cesium-137 is performed using a MathCad[a] file. The steps to data processing are the following:

1. The energy calibration is established.
2. Based upon the 661 keV energy, the predicted channel is computed from the energy calibration.
3. A MathCad file is used to fit a linear background plus 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, and calibration coefficients applied and the cesium-137 concentrations and depths output to a comma delimited file.
5. Logging plots are made with only those computed cesium-137 that are above the minimum detect levels, which is conservatively set at 0.7 pCi/g, based upon statistical merits of the fittings.

[a] MathCad is a commercial software program produce by the PTC corporation.

2.4 INFRARED TEMPERATURE LOGGING

The temperature of a vadose zone soil yields a typical geothermal gradient given that no source of heat, such as a highly contaminated zone, is present. If a source of heat is present, the temperature change in the vadose zone soil is dependent upon the intensity of the source. A radioactive zone with high levels of contamination generates more heat the higher the level of radionuclide concentration. Due to the high levels of contaminants present around many of the known leaking tanks, the heat signature (increase in temperature over the normal geothermal gradient) can be detected hundreds of feet from the plume resulting from the leak.

Because of the high heat conductivity in soils and the resultant large distances that the temperature increases can be seen, null readings of temperature are important. Null temperature readings in this context are the expected normal geothermal gradients. These null readings help to identify the location and boundaries of a contaminant plume.

Historical measurements of drywell, direct push, and borehole temperatures have demonstrated the soil heating effect of the presence of high levels of contamination through deviation from normally observed geothermal gradient profiles. In the past, the temperature of vadose zone soil was measured with instruments that measured the air temperature surrounding the instrument inside the casing or direct push tubing. This approach provided inconsistent results because the ambient temperature inside the casing or direct push tubing was changed by the data collection process (e.g. the effects of opening the well to the atmosphere and the movement of the logging tool into and out of the borehole). To overcome this interference, an infrared (IR) temperature sensor was deployed that measures the casing temperature, thus mitigating the effects of air temperature changes during the logging process. Direct reading of the casing temperature more closely measures the equilibrium temperature of the vadose zone soil in contact with the casing and is not affected by the logging process.

2.5 GYROSCOPE LOGGING AND CALIBRATION

The gyroscope logging instrument was used to analyze for the actual trajectory of the angled pushes. Gyroscope logs were not conducted on the vertical pushes. The purpose of the gyroscope logging is three fold. The deviation data collected is initially used to ensure the path of the drive tubing does not intersect with any subsurface structure, specifically the underground tanks Secondly, the data is used to correlate with the geophysical log data collected to select target depths for sample collections (the geophysical log data collected along the pipe run was recalculated for depth based on the gyroscope data collected along the same pipe run). Finally, the data is used to calculate the actual depths for samples collected.

The initial gyroscope run is performed when the drive tubing has been advanced to a depth of approximately 45 ft bgs. The gyroscope data is analyzed and the path extraplated to determine if the path of the push is on target to avoid (miss) the underground tank footer. Once the data is reviewed a decision is made to continue the advancement of the push or to decommission and re-start. Advancement of the push is not permitted until the go/no-go decision is made.

Two gyroscope instruments were used. The BGO-02 Dual Gyroscope and Tiltmeter manufactured by IFG Corporation was used to collect gyroscope data from all but one push. The IFG gyroscope ceased collecting data while logging push C9388. The gyroscope required return to the manufacturer for repair. A Reflex EZ-Gyroscope was leased from Reflex Technology International Pty Ltd as a temporary replacement to allow push operations to continue. The Reflex gyroscope was used to collect gyroscope data from push C9388.

The IFG gyroscope measures the rate of change within a borehole in a continuous mode with data being transmitted directly thru the logging cable to a computer at surface. When logging with the IFG Gyroscope, a minimum of 3 passes were performed. The data is collected by the computer and require processing. The data was averaged and the log run nearest the average was selected for use in the data set. The Reflex gyroscope collects data on a stop and acquire mode. It has two settings, one for collecting a single reading (standard mode) and one for collecting 3 readings (optimized mode) spaced over a few minutes. The Reflex gyroscope was run in the optimized mode. This gyroscope collects and stores the data. The data is downloaded to a dedicated laptop and is automatically processed by the installed software. These readings are automatically averaged and the average readings were used as the data set.

Both instruments are calibrated by the manufacturers at their facilities.

Gyroscope logging results depicted as a plan view of the tubing path, along with the planned trajectory of each push are provided in Attachment B.

2.6 DEPTH MEASUREMENTS

A small hoist is mounted on a four-wheeled wagon. There is communication electronics, encoder wheel and electronics for depth measurements and a laptop that communicates with the instruments over the logging cable. The computer simply reads the signal over the logging cable and places the raw data into an ASCII file for later processing. MathCad and Excel[b] are used to apply the calibrations to each set of raw data and produce the concentrations and % moisture by volume and the IR temperature of the casing.

2.7 NEUTRON MOISTURE LOGGING AND CALIBRATION

The neutron moisture tool combines the Atkins provided thermal neutron detector and a DOE-owned sealed neutron source (50 mCi americium-beryllium). The DOE-owned neutron source was used because it was already on the Hanford Site and was managed by the DOE radiation management program. The neutron source is an integral component of a neutron moisture detector, manufactured by Instrotek.

The integrity of the sealed neutron source was always maintained when it was used in calibration activities and in direct push logging activities. Source integrity was achieved by inserting the Atkins provided neutron detector module into the housing containing the sealed neutron source. Calibration was performed in six calibration models (Meisner and Randall 1995). Three models have 6-in. casing size and three models have 8-in. casing size. The moisture content of each

[b] Excel is part of the software package Office produced by Microsoft corporation.

model in a set of three models is different (5%, 12%, or 20% by volume). The detector count rate in each of the six calibration models is summarized in Table 4. See Attachment C for the calibration certificates.

Table 4. Moisture Calibration Data

Moisture Content % Volume Fraction	6-in. Models* (cps)	8-in. Models* (cps)
0.050	1.76	1.76
0.117	1.74	NA
0.119	NA	1.76
0.197	NA	1.70
0.198	1.70	NA

*Count rates are mean of 10 sample measurements at 60 seconds each.
cps = counts per second
NA = not applicable

The push tubing size for this project was 2.5 in. outer diameter, therefore, the moisture calibration was extrapolated to the correct tubing size. The moisture calibration certificates for the 2.5 in. outer diameter push tubing are in Attachment C.

The moisture logging was collected at one-foot per minute. Processing of the moisture logging data requires that the direct push logging data be normalized to the thickness of the push tubing present in the calibration models (0.325 in.). Given that the push tubing thickness is 0.37 in., a correction factor of 1.055 is required to increase (normalize) the observed detector count rate to the conditions of the calibration model (Meisner et at. 1996).

3.0 CONCLUSIONS

Within A Farm, scintillation gross gamma, spectral gamma, any identified man-made radionuclides, IR temperature, and volume % moisture were measured in five logging pushes. The sampling and logging pushes were advanced to depths between approximately 178.0 ft pipe run (113.2 ft bgs at angle direct push C9396) and 285.5 ft bgs (at vertical direct push C9385). Table 5 lists a summary of each direct push and conditions.

The following are general conclusions from the field geophysical logging effort (refer to Attachment B for specific push conclusions):

- Man-made radionuclides were detected in four of the pushes logged, the majority at or within 24 ft of surface. A detection was observed at 99 ft pipe run (66 ft bgs) in C9395. Near-surface detections were low concentrations, typically less than 15 pCi/g.

- All five logging pushes show temperature deviations from normal geothermal gradient. The maximum temperature is 122.2 °F at approximately 62 ft bgs. C9395 had the highest temperature and is therefore closest to the contaminant that is at the bottom of the tanks or just below tanks. These elevated temperatures are due to high levels of radioactivity at large distance from the direct push. There were documented high gamma and high temperatures observed in the A Farm laterals logged in 2005 (Randall & Price 2005).

- Very high moisture readings (>50%) were recorded (more than possible with water and normal soils). Elements of high capture cross-section are suspected as the cause. One such element or compound is nitrates, which has been observed in vadose zone soil samples at previous pushes.

- Push hole deviation was observed in all of the angle pushes. The direct push method of advancing pipe does not allow for maintaining a planned trajectory or correcting deviation as the tubing is advanced. The direction of the observed deviation is not consistent between pushes and is influenced by the geology of the subsurface.

Table 5. Summary of Results at Logging Direct Pushes

Direct Push ID	Log Interval (pipe run)	Cesium-137 Interval	Maximum Cesium-137 (pCi/g)	Maximum Moisture (% and ~depth)	Maximum Temperature (°F and ~depth)
C9385	282 ft - gs	24 ft bgs to gs	<15	40 from 270 to 274 ft bgs	120.6 at 48 ft bgs
C9387	291 ft - gs	None identified	None identified	27.5 at 16.5 ft bgs	114.8 at 60 ft bgs
C9391	275 ft - gs	2 ft pipe run (0.5 ft bgs) to gs	14	22 at 3.5 ft bgs	116.6 at 63 ft bgs
C9393	288 ft - gs	gs	<15	52 at 266.0 ft bgs	100.9 at 65 ft bgs
C9395	194 ft - gs	4 and 99 ft pipe run (1 and 66 ft bgs)	<15	18 at 105 ft bgs	122.2 at 61.6 ft bgs

gs = ground surface
ft bgs = feet below ground surface

4.0 REFERENCES

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Attachment A: Sample and ERT Location Information Based on Gyroscope Results

Performance of direct push at an angle required the use of a gyroscope to track the subsurface path of the push tubing and document the precise northing, easting, and elevation of each sample that is collected. The gyroscope measured the change in northing and easting with respect to ground surface along the angled length of push tubing. This relative changes in northing and easting can then be converted to Washington State Plane South coordinates so sample locations and elevation can be directly compared to other vadose zone soil samples. Tables A1 through A4 include the original gyroscope measuremements as changes in northing, easting, and depth with the final coordinates in Washington State Plane South. A gyroscope survey was not performed at the vertical direct push (C9386), sample depth information is included in the completion report (refer to Table 2-2).

Electrical resistivity tomography (ERT) sensors were installed in the four angle direct pushes for logging. The the depth, northing, easting and elevation of each ERT sensor at pushes C9387 and C9391 are identified in Table A5. The depth, northing, easting and elevation of each ERT sensor at pushes C9393 and C9395 are identified in Table A6.

Table A1. Sample Location Information for Direct Push C9388

Sample Depth (ft pipe run)	Change in Northing[a] (ft)	Change in Easting[a] (ft)	Change in Elevation[a] (ft)	Change in Northing[a] (m)	Change in Easting[a] (m)	Change in Elevation[a] (m)	Sample Depth Mid-point (ft pipe run)	Northing (m)	Easting (m)	Elevation (m)
Surface	-	-	-	-	-	-	-	136097.19	575305.76	211.10
9-11	-2.397	1.4268	4.14943	-0.73	0.43	1.26	10	136096.46	575306.19	212.36
15-17	-4.81026	2.8771	8.28128	-1.47	0.88	2.52	16	136095.72	575306.64	213.62
63-65	-29.5396	18.291	48.9071	-9.00	5.58	14.91	64	136088.19	575311.34	226.01
124-126	-61.0571	39.653	95.2419	-18.61	12.08	29.03	125	136077.58	575317.85	240.13
141-143	-69.1555	45.897	106.214	-21.08	13.99	32.65	142	136076.11	575319.75	243.47
161-163	-83.0449	57.405	123.51	-25.31	17.50	37.65	162	136071.88	575323.26	248.75
184-186	-94.5523	67.466	136.405	-28.82	20.56	41.58	185	136068.37	575326.32	252.68
203-205	-143.174	104.19	148.693	-43.64	31.76	45.32	204	136053.55	575337.52	256.42
290-292	-195.177	156.47	190.192	-59.49	47.69	57.97	291	136037.70	575353.45	269.07

a. Measurement from gyroscope Reflex EZ Gyroscope, “Approved” pass data.

Table A2. Sample Location Information for Direct Push C9392

Sample Depth (ft pipe run)	Change in Northing[a] (ft)	Change in Easting[a] (ft)	Change in Elevation [a] (ft)	Change in Northing[a] (m)	Change in Easting[a] (m)	Change in Elevation[a] (m)	Sample Depth Mid-point (ft pipe run)	Northing (m)	Easting (m)	Elevation (m)
Surface	-	-	-	-	-	-	-	136103.76	575351.57	210.60
8-10	-4.45	-1.16	-7.82	-1.36	-0.35	-2.38	9	136102.40	575351.22	208.22
14-16	-7.56	-1.88	-13.10	-2.30	-0.57	-3.99	15	136101.46	575351.00	206.61
54-56	-28.58	-5.80	-46.60	-8.71	-1.77	-14.20	55	136095.05	575349.80	196.40
60-62	-31.94	-6.26	-51.74	-9.73	-1.91	-15.77	61	136094.03	575349.66	194.83
113-115	-64.19	-8.07	-93.49	-19.57	-2.46	-28.50	114	136084.19	575349.11	182.10
158-160	-96.02	-5.56	-125.38	-29.27	-1.69	-38.22	159	136074.49	575349.88	172.38
190-192	-120.02	-0.30	-145.77	-36.58	-0.09	-44.43	191	136067.18	575351.48	166.17
254-256	-173.16	11.34	-178.95	-52.78	3.46	-54.54	255	136050.98	575355.03	156.06
262-264	-180.40	12.80	-181.88	-54.98	3.90	-55.44	263	136048.78	575355.47	155.16
266-268	-183.99	13.52	-183.30	-56.08	4.12	-55.87	267	136047.68	575355.69	154.73

a. Measurement made by gyroscope using raw data from pass 3.

Table A3. Sample Location Information for Direct Push C9394

Sample Depth (ft pipe run)	Change in Northing[a] (ft)	Change in Easting[a] (ft)	Change in Elevation[a] (ft)	Change in Northing[a] (m)	Change in Easting[a] (m)	Change in Elevation[a] (m)	Sample Depth Mid-point (ft pipe run)	Northing (m)	Easting (m)	Elevation (m)
Surface	-	-	-	-	-	-	-	136102.79	575354.67	210.60
7-9	-2.18	-0.02	-7.44	-0.66	-0.01	-2.27	8	136102.13	575354.66	208.33
12-14	-3.62	-0.04	-12.37	-1.10	-0.01	-3.77	13	136101.69	575354.66	206.83
107-109	-29.65	1.61	-103.76	-9.04	0.49	-31.62	108	136093.75	575355.16	178.98
146-148	-39.55	2.73	-141.53	-12.05	0.83	-43.14	147	136090.74	575355.50	167.46
164-166	-45.44	3.49	-158.59	-13.85	1.06	-48.34	165	136088.94	575355.73	162.26
177-179	-49.75	4.28	-170.71	-15.16	1.30	-52.03	178	136087.63	575355.97	158.57
196-198	-55.69	5.52	-188.76	-16.97	1.68	-57.54	197	136085.82	575356.35	153.06
288-290	-91.28	20.15	-271.91	-27.82	6.14	-82.88	289	136074.97	575360.81	127.72
293-295	-93.55	21.45	-276.21	-28.51	6.54	-84.19	294	136074.28	575361.21	126.41

a. Measurement made by gyroscope using raw data from pass 3.

Table A4. Sample Location Information for Direct Push C9396

Sample Depth (ft pipe run)	Change in Northing[a] (ft)	Change in Easting[a] (ft)	Change in Elevation [a] (ft)	Change in Northing (m) [a]	Change in Easting (m) [a]	Change in Elevation (m) [a]	Sample Depth Mid-point (ft pipe run)	Northing (m)	Easting (m)	Elevation (m)
Surface	-	-	-	-	-	-	-	136104.23	575362.66	210.60
10-12	-8.10	-0.04	-7.65	-2.47	-0.01	-2.33	11	136101.76	575362.65	208.33
17-19	-13.06	-0.01	-12.38	-3.98	-0.00	-3.77	18	136100.25	575362.66	206.83
78-80	-57.25	1.75	-54.40	-17.45	0.53	-16.58	79	136086.78	575363.19	194.02
97-99	-71.30	2.97	-67.27	-21.73	0.91	-20.50	98	136082.50	575363.57	190.10
99-101	-72.90	3.13	-68.64	-22.22	0.96	-20.92	100	136082.01	575363.62	189.68
105-107	-77.24	3.61	-72.37	-23.54	1.10	-22.06	106	136080.69	575363.76	188.54
162-164	-121.05	13.20	-107.29	-36.90	4.02	-32.70	163	136067.33	575366.68	177.90
176-178	-132.20	16.59	-114.86	-40.30	5.06	-35.01	177	136063.93	575367.72	175.59

a. Measurement made by gyroscope using raw data from pass 2.

Table A5. ERT Sensor Location Information for Direct Pushes C9387 and C9391

C9387				C9391			
ERT Sensor (ft pipe run)	Northing (m)[a]	Easting (m)[a]	Elevation (m)[a]	ERT Sensor (ft pipe run)	Northing (m)[b]	Easting (m)[b]	Elevation (m)[b]
7	136095.47	575305.95	209.24	4	136101.11	575349.36	209.34
17	136094.13	575306.77	206.93	13	136099.81	575349.03	207.11
25	136092.85	575307.57	204.72	21	136098.53	575348.72	204.91
35	136091.49	575308.48	202.35	30	136097.20	575348.41	202.65
44	136090.19	575309.39	200.10	38	136095.91	575348.12	200.49
53	136088.96	575310.27	197.94	47	136094.57	575347.83	198.28
62	136087.64	575311.21	195.63	55	136093.20	575347.55	196.07
71	136086.35	575312.15	193.38	64	136091.84	575347.30	193.87
80	136085.05	575313.11	191.18	72	136090.48	575347.06	191.70
89	136083.75	575314.12	188.99	81	136089.09	575346.83	189.55
98	136082.47	575315.15	186.81	90	136087.65	575346.60	187.33
107	136081.21	575316.24	184.57	98	136086.27	575346.39	185.23
115	136080.06	575317.30	182.49	106	136084.85	575346.17	183.09
124	136078.87	575318.46	180.28	115	136083.36	575345.95	180.92
134	136077.70	575319.67	178.05	124	136081.89	575345.73	178.79
143	136076.60	575320.89	175.89	132	136080.45	575345.53	176.70
152	136075.52	575322.20	173.70	140	136078.97	575345.36	174.53
161	136074.41	575323.66	171.70	149	136077.50	575345.23	172.43
170	136073.29	575325.22	169.65	157	136076.00	575345.12	170.29
179	136072.20	575326.76	167.71	166	136074.52	575345.04	168.18
187	136071.12	575328.31	165.83	174	136073.02	575344.99	166.08
197	136069.97	575329.97	163.89	183	136071.51	575344.97	163.99
205	136068.88	575331.60	162.02	191	136069.97	575344.97	161.89
214	136067.82	575333.32	160.14	200	136068.45	575344.99	159.80
224	136066.80	575335.10	158.28	208	136066.92	575345.04	157.71
233	136065.81	575336.97	156.45	217	136065.31	575345.15	155.69
242	136064.88	575338.79	154.73	225	136063.67	575345.28	153.69
251	136063.96	575340.71	153.00	234	136062.02	575345.43	151.71

Table A5. ERT Sensor Location Information for Direct Pushes C9387 and C9391

C9387				C9391			
ERT Sensor (ft pipe run)	Northing (m)[a]	Easting (m)[a]	Elevation (m)[a]	ERT Sensor (ft pipe run)	Northing (m)[b]	Easting (m)[b]	Elevation (m)[b]
259	136063.06	575342.66	151.31	242	136060.34	575345.61	149.72
269	136062.18	575344.69	149.66	251	136058.64	575345.81	147.76
278	136061.32	575346.79	148.01	259	136056.94	575346.06	145.83
287	136060.51	575348.87	146.49	268	136055.20	575346.35	143.93
296	136059.73	575351.07	145.01	276	136053.44	575346.67	142.07

a. Measurement made by gyroscope using raw data from pass 3.
b. Measurement made by gyroscope using raw data from pass 1.
ERT = Electrical resistivity tomography

Table A6. ERT Sensor Location Information for Direct Pushes C9393 and C9395

C9393				C9395			
ERT Sensor (ft pipe run)	Northing (m)[a]	Easting (m)[a]	Elevation (m)[a]	ERT Sensor (ft pipe run)	Northing (m)[b]	Easting (m)[b]	Elevation (m)[b]
5	136101.76	575355.28	209.36	3	136102.97	575363.27	210.11
14	136100.91	575355.31	206.71	9	136101.64	575363.32	208.91
23	136100.07	575355.33	204.13	15	136100.29	575363.36	207.69
32	136099.21	575355.35	201.52	21	136098.93	575363.37	206.47
41	136098.33	575355.36	198.93	27	136097.55	575363.36	205.22
50	136097.42	575355.35	196.30	33	136096.22	575363.34	204.00
59	136096.51	575355.35	193.71	39	136094.87	575363.30	202.76
68	136095.59	575355.39	191.13	45	136093.53	575363.24	201.52
77	136094.69	575355.43	188.57	51	136092.16	575363.17	200.27
86	136093.80	575355.39	185.96	57	136090.85	575363.09	199.12
95	136092.87	575355.26	183.38	63	136089.45	575362.98	197.89
104	136091.92	575355.10	180.84	69	136088.04	575362.86	196.63
113	136090.93	575354.91	178.27	75	136086.72	575362.73	195.45
122	136089.89	575354.73	175.74	81	136085.35	575362.58	194.20
131	136088.82	575354.54	173.23	87	136083.98	575362.43	192.96
140	136087.71	575354.36	170.72	93	136082.68	575362.26	191.77
149	136086.58	575354.17	168.23	99	136081.31	575362.06	190.54
158	136085.52	575353.98	165.71	105	136079.88	575361.83	189.41
167	136084.47	575353.76	163.19	111	136078.47	575361.60	188.29
176	136083.40	575353.54	160.64	117	136077.06	575361.35	187.17
185	136082.34	575353.29	158.12	123	136075.64	575361.09	186.02
194	136081.26	575353.03	155.63	129	136074.22	575360.82	184.87
201	136080.41	575352.83	153.68	135	136072.84	575360.55	183.74
212	136079.10	575352.49	150.63	141	136071.45	575360.27	182.59
221	136077.99	575352.20	148.11	147	136069.98	575359.97	181.50

Table A6. ERT Sensor Location Information for Direct Pushes C9393 and C9395

C9393				C9395			
ERT Sensor (ft pipe run)	**Northing (m)[a]**	**Easting (m)[a]**	**Elevation (m)[a]**	**ERT Sensor (ft pipe run)**	**Northing (m)[b]**	**Easting (m)[b]**	**Elevation (m)[b]**
230	136076.89	575351.89	145.63	153	136068.52	575359.67	180.44
239	136075.79	575351.52	143.15	159	136067.06	575359.36	179.38
248	136074.70	575351.14	140.67	165	136065.63	575359.03	178.32
257	136073.61	575350.73	138.15	171	136064.21	575358.68	177.25
266	136072.55	575350.32	135.67	177	136062.78	575358.31	176.18
275	136071.49	575349.89	133.18	183	136061.35	575357.93	175.09
284	136070.44	575349.43	130.68	189	136059.92	575357.51	174.00
293	136069.39	575348.89	128.22	195	136058.53	575357.07	172.94

a. Measurement made by gyroscope using raw data from pass 1.
b. Measurement made by gyroscope using raw data from pass 2.
ERT = Electrical resistivity tomography

Attachment B: Geophysical, Temperature, and Gyroscope Logging Results

Geophysical, temperature, and gyroscope logging results along with volume % moisture are provided in this attachment. Each logging direct push has a header page and plot containing logging information. The header page identifies the tools used, general obeservations and conclusions along with calibration file information. The following pages contain plots of gross gamma, volume % moisture, any identified man-made radionuclides, IR temperature, and KUT values. After these pages, there is a single page plot of the temperature. The last page for each of the four angle push locations contains two charts with gyroscope results, one for the logging direct push hole and one for the sampling direct push hole. The gyroscope charts show, in planar view, the planned plan and the actual trajectory of each direct push's tubing path.

[a]KUT = potassium-40, uranium-238 and thorium-232

A-Farm C9385 Header Information

Small Diameter –Moisture/Gamma Survey

Log Dates: July 25 - Oct 16, 2018 Depth Ref: Ground Surface

Observations

A combination High Energy Resolution gamma CeBr and High Efficiency gamma detector BGO-1 tool was used for the gamma logging. At a depth of 100 feet below ground surface (ft bgs), the combination tool hung up on the push tubing and separated from the logging cable, dropping to the bottom of the direct push hole. Upon retrieval, the combination tool was found to be damaged beyond repair. The combination tool successfully collected data from 282 to 100 ft bgs. A backup High Efficiency gamma detector BGO tool, BGO-3, was used for the remainder of the log (100 ft bgs to surface). There was no spare CeBr crystal available for a new High Energy Resolution gamma detector tool assembly. Cs-137 is visible from the BGO-3 data from 24 ft bgs to surface. No CeBr data is available over this interval for Cs-137 concentration. The BGO tool is only calibrated for Gross gamma and KUT. The concentration of Cs-137 observed is estimated to be less than 15 pCi/g at maximum value with the highest concentrations of Cs-137 at the surface, as observed with the BGO-3 data.

The moisture measurement is derived from an instrument manufactured by Instro Tek Corporation. The instrument contains a neutron source and a thermal neutron detector. The gauge responds primarily to the surrounding hydrogen, hence water. Moisture values range from 5 to 40%.

The temperature measurement is derived from the Omega Smart IR Temperature probe and run with the moisture tool. This probe measures the surface temperature of a solid or liquid without contact and can measure between -70 to 380°C (-94 to 716°F). Temperature values range from 25.8 °C (78.4 °F) to 49.2 °C (120.6 °F) with the maximum temperature recorded is 49.2 °C (120.6 °F) at a depth of 48 ft bgs.

This is a vertical direct push, therefore there was no gyroscope deviation survey conducted.

Conclusions

The low KUT[a] readings at the single depth of 72 ft bgs is due to a very strong magnetic-field gain-drop (instantaneous). The 40% moisture values are unreasonable, and not possible from water filled pore structure. It is thought that there is a high neutron capture cross section element (such as nitrates) over the depth interval 268 to 278 ft bgs, where the 40% values are reached. The temperature does not show normal geologic gradient. The temperature profile is indicative of a highly radioactive heat source remote from the direct push.

Calibration Certificates

Moisture
Date: Jun 20, 2018
Electronic File: Moist-2_2013-v1.zip

Gamma BGO
Date: Jun 11, 2018 BGO-1 and Oct 11, 2018 BGO-3

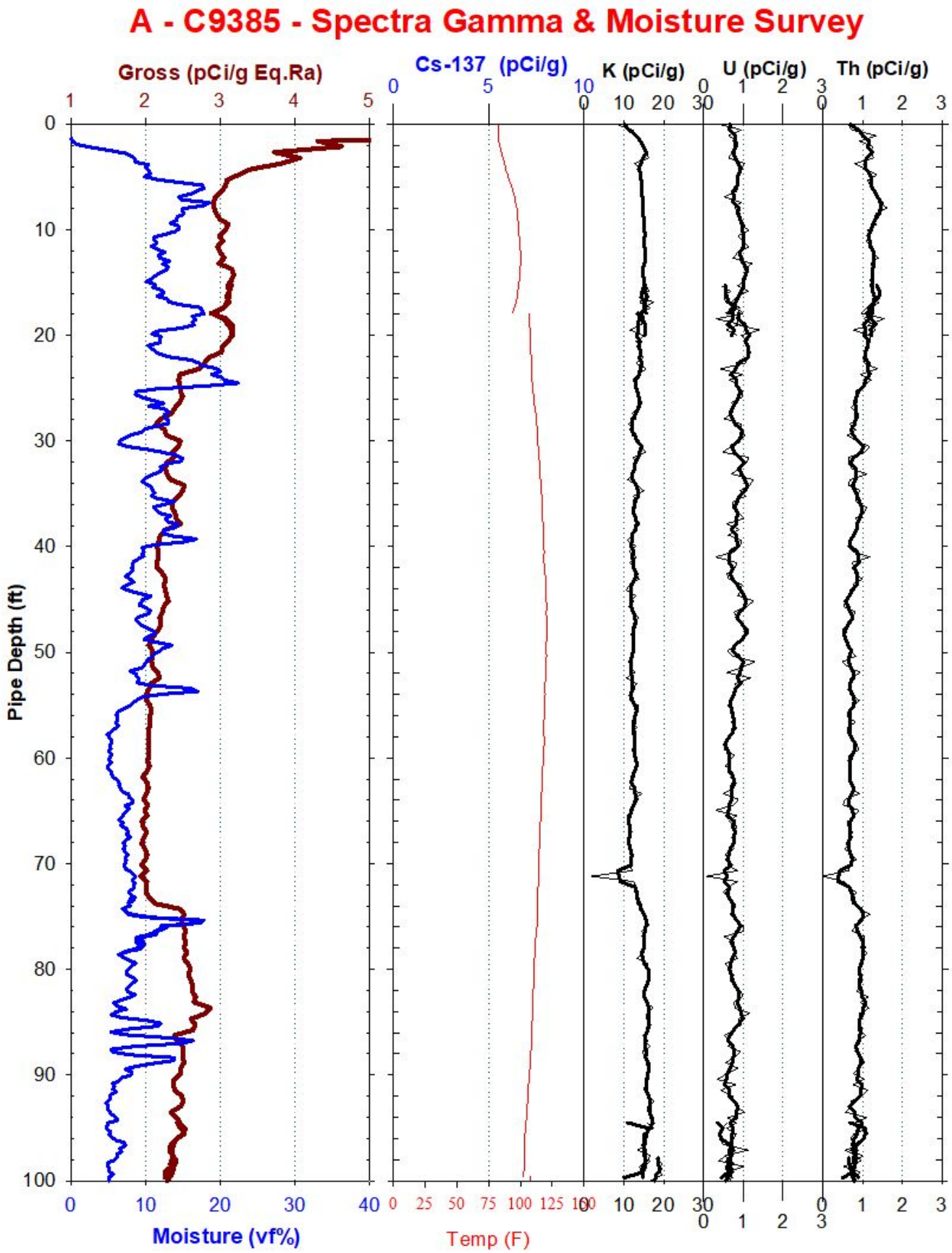
[a]KUT = potassium-40, uranium-238 and thorium-232

Electronic File:	BGO-1_Jun2018-v1.zip and BGO-3_Oct2018-v1.zip

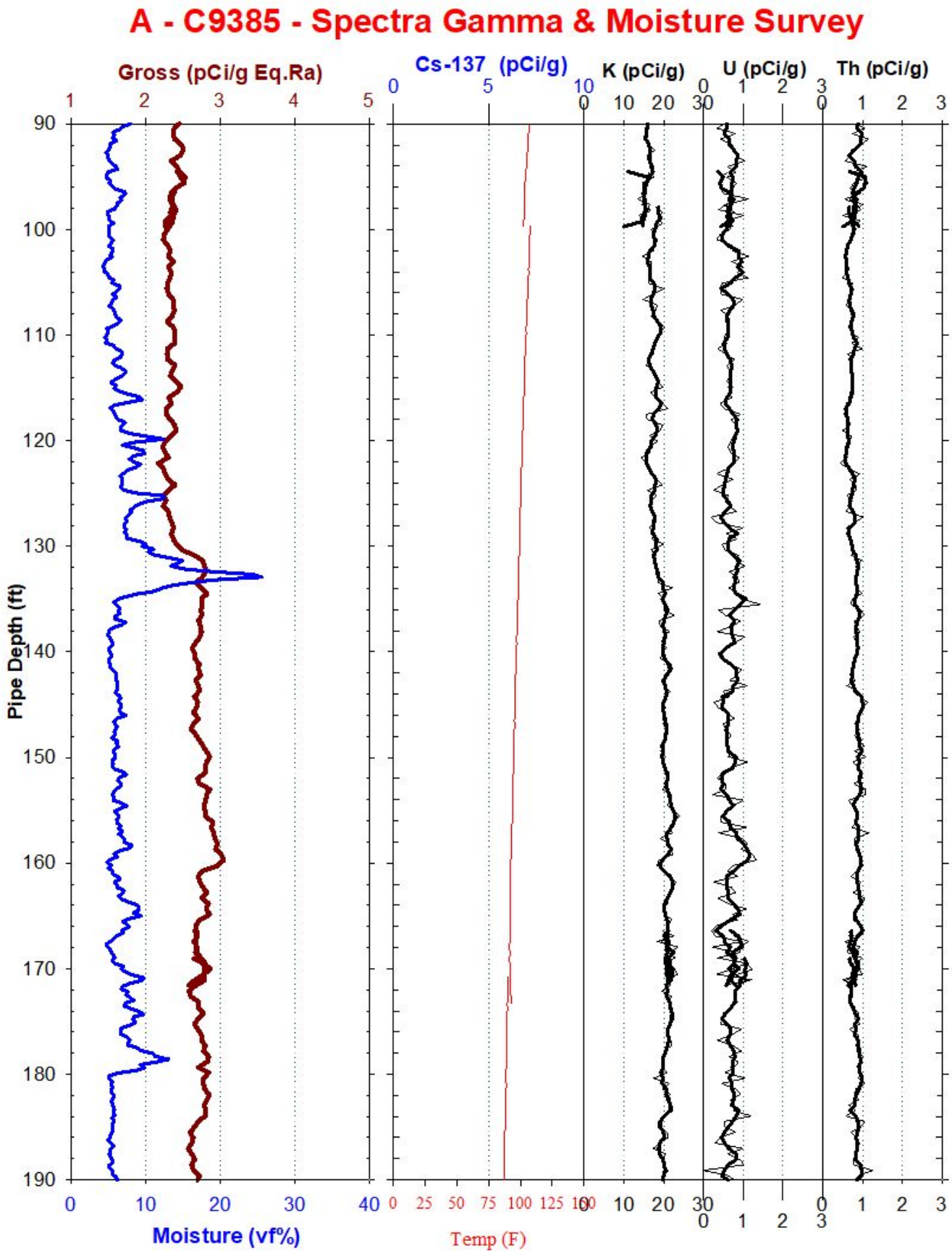
CeBr

Date:	June 11, 2018
Electronic File:	CeBr-1_Jun2018-v1.zip

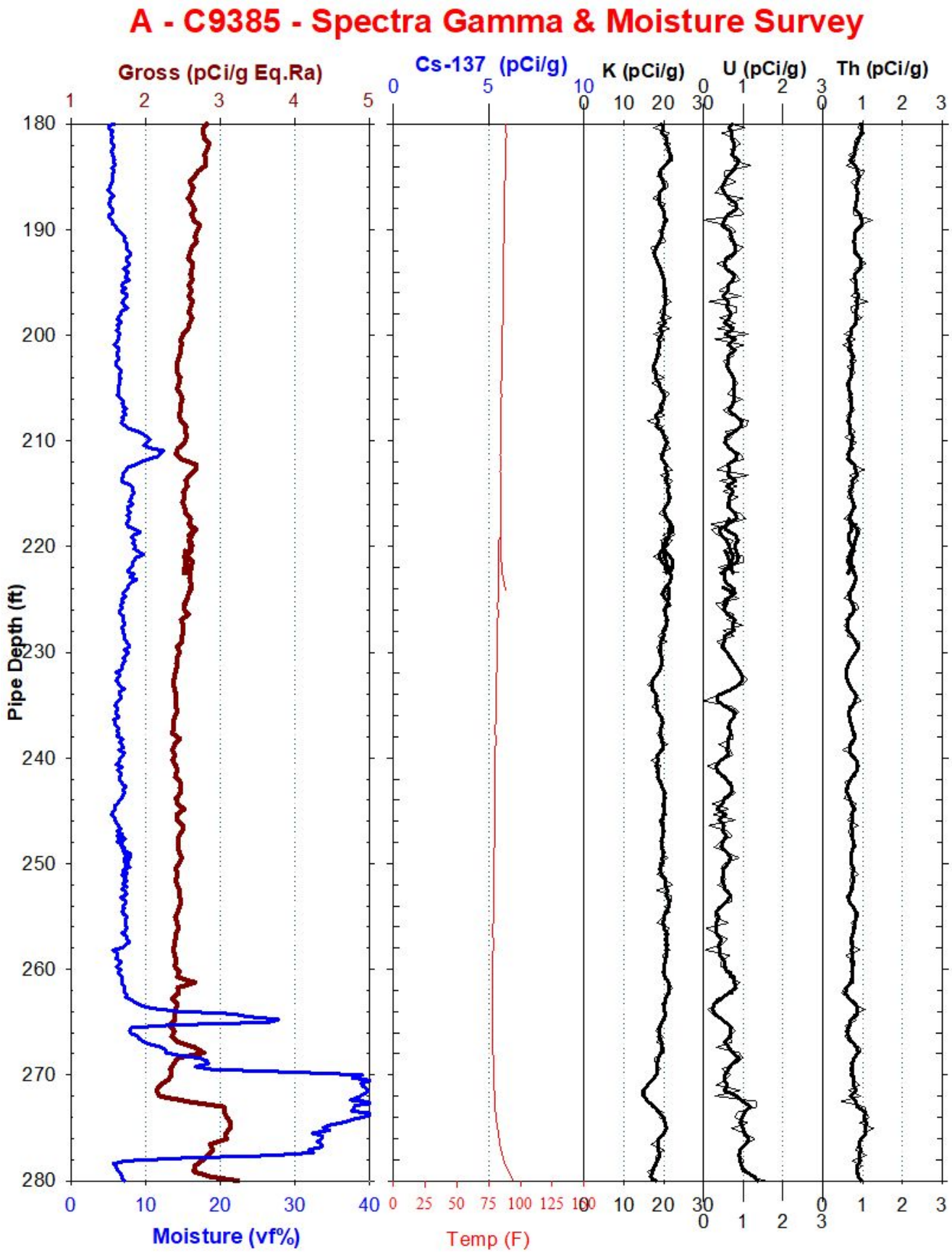
[a]KUT = potassium-40, uranium-238 and thorium-232



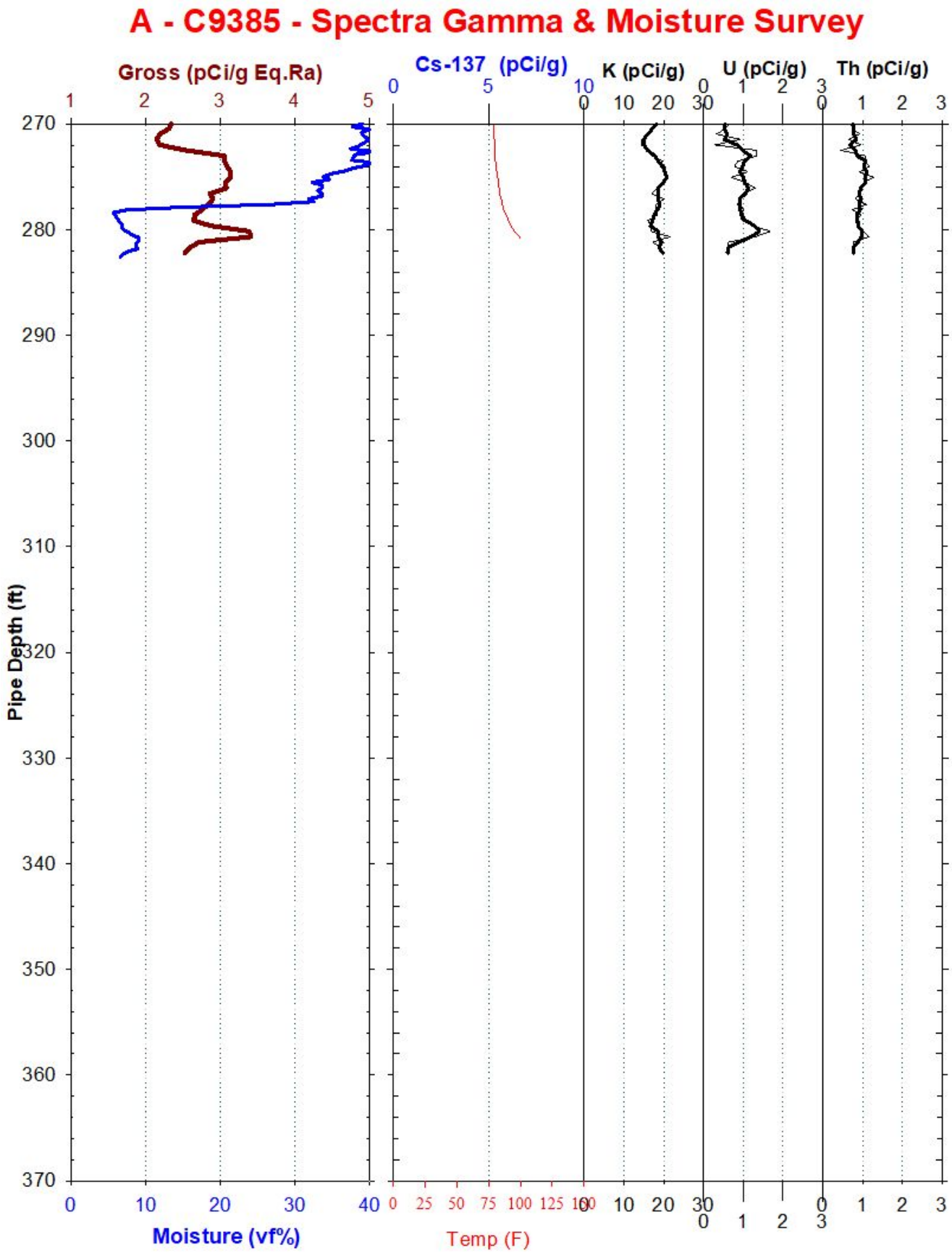
[a]KUT = potassium-40, uranium-238 and thorium-232



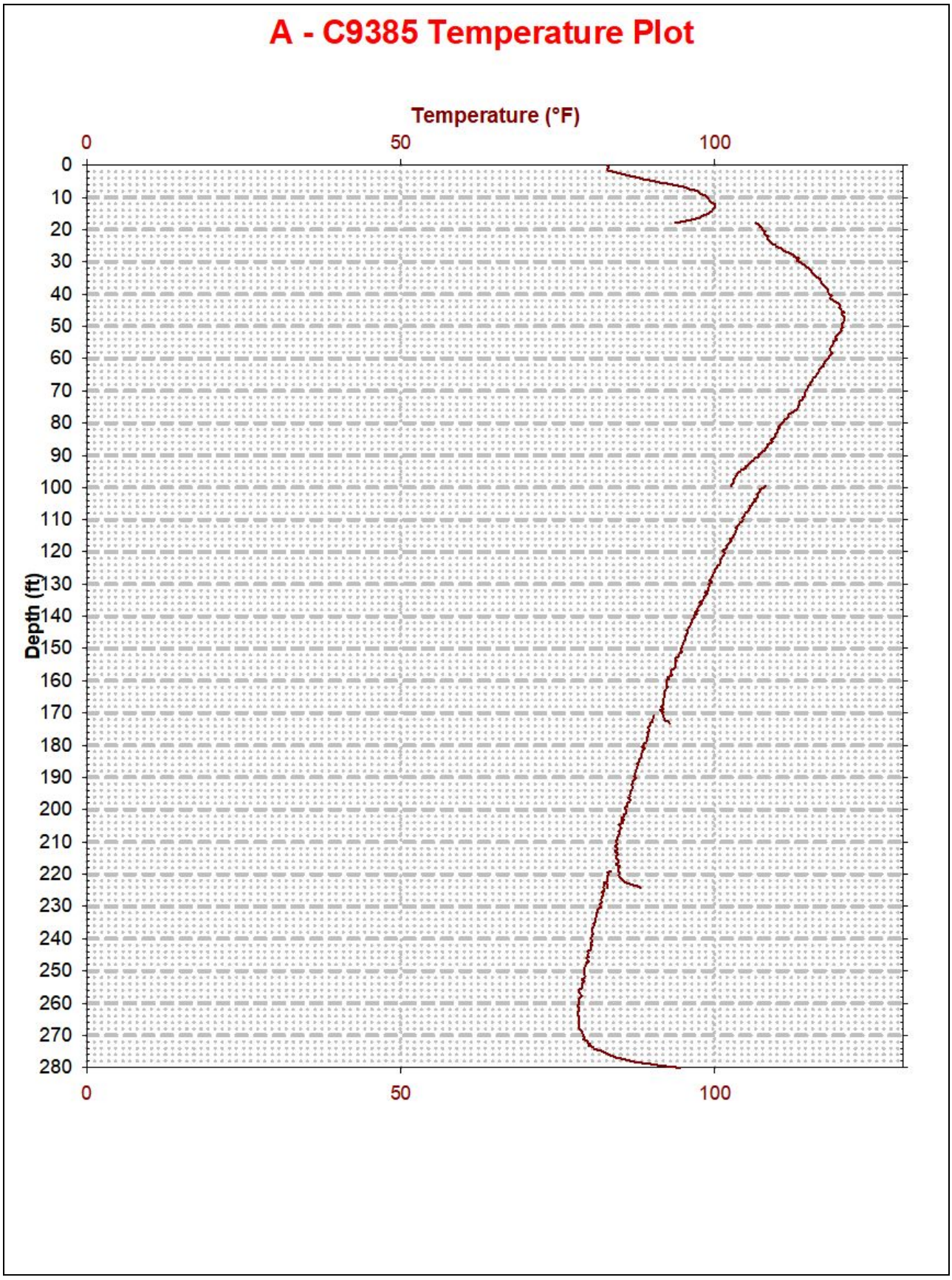
[a]KUT = potassium-40, uranium-238 and thorium-232



[a]KUT = potassium-40, uranium-238 and thorium-232



[a]KUT = potassium-40, uranium-238 and thorium-232



Note: Vertical direct push, depths are in ft bgs

A-Farm C9387 Header Information

Small Diameter –Moisture/Gamma Survey

Log Date: May 13 - Jun 6, 2019 Depth Ref: Ground Surface

Observations

A combination High Energy Resolution gamma CeBr and High Efficiency gamma detector BGO-3 tool was used for the gamma logging from 291 to 181 feet (ft) pipe run. The tool became separated from the logging cable causing damage to the CeBr tool. For the remaining of the logging, 181 ft pipe run to surface, the High Efficiency gamma detector BGO-3 tool was used for the gamma logging. There was not a spare CeBr crystal to assemble a new High Energy Resolution gamma detector tool. Two sets of KUT[a] plots are provided; one in ft pipe run and one in ft below ground surface (ft bgs). Cs-137 is not observed.

The moisture measurement is derived from an instrument manufactured by Instro Tek Corporation. The instrument contains a neutron source and a thermal neutron detector. The gauge responds primarily to the surrounding hydrogen, hence water. Moisture values range from 5.7 to 27.5%. Moisture values show many thin stringers from 20 to 80 ft pipe run with one lens at 163 ft pipe run.

The temperature measurement is derived from the Omega Smart IR Temperature probe and run with the moisture tool. This probe measures the surface temperature of a solid or liquid without contact and can measure between -70 to 380°C (-94 to 716°F). Temperature values range from 20.4 °C (68.7 °F) to 46 °C (114.8 °F) with the maximum temperature recorded is 46 °C (114.8 °F) at a depth of near 65 ft pipe run.

Plan view plots of direct push gyroscope deviation results from the geophysical logging push and sampling push are also included (C9387 and C9388, respectively).

Conclusions

The temperature does not show normal geologic gradient. The temperature profile is indicative of a highly radioactive heat source remote from the direct push.

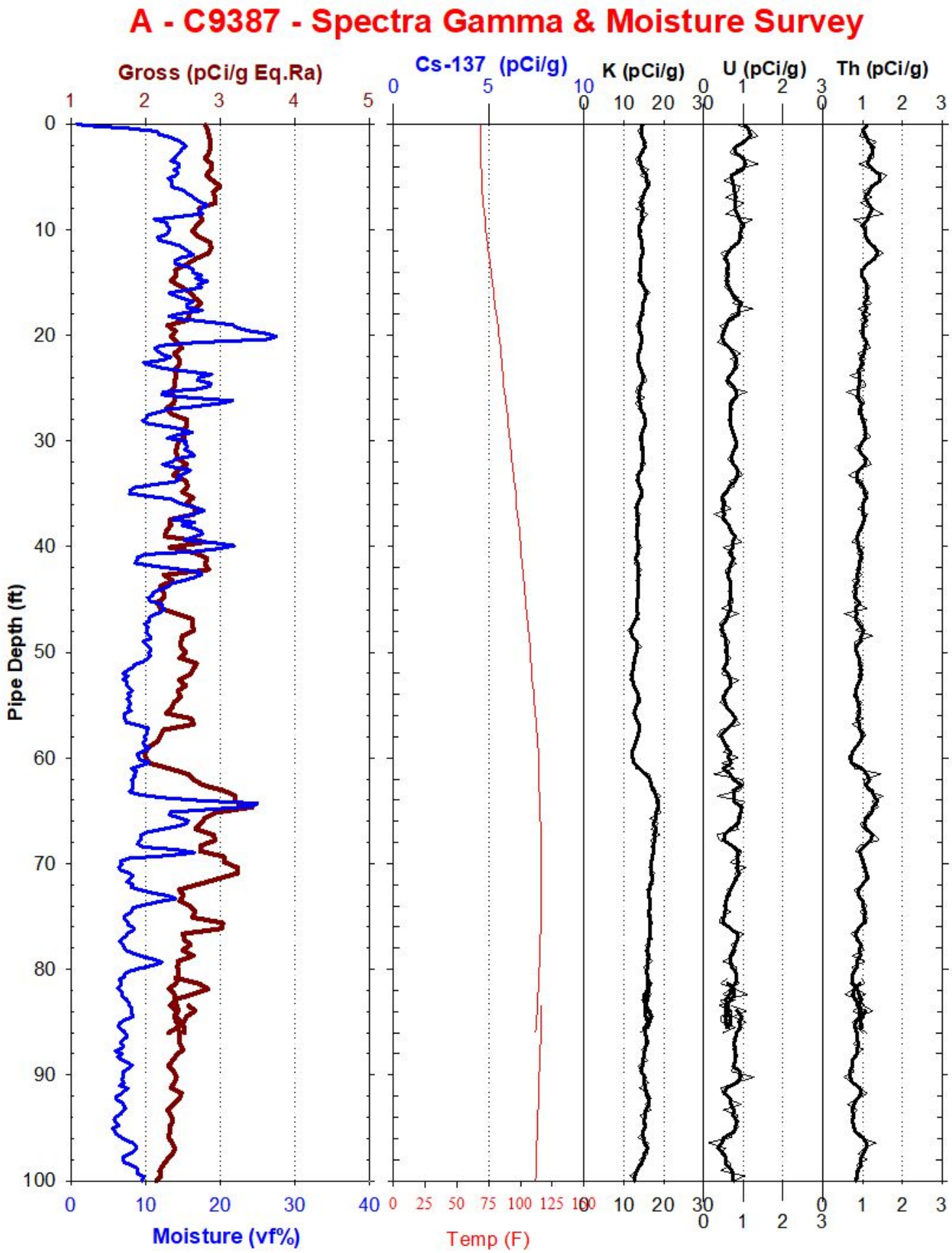
Calibration Certificates

Moisture
Date: Oct 11, 2018
Electronic File: Moist-1_2018-v1.zip

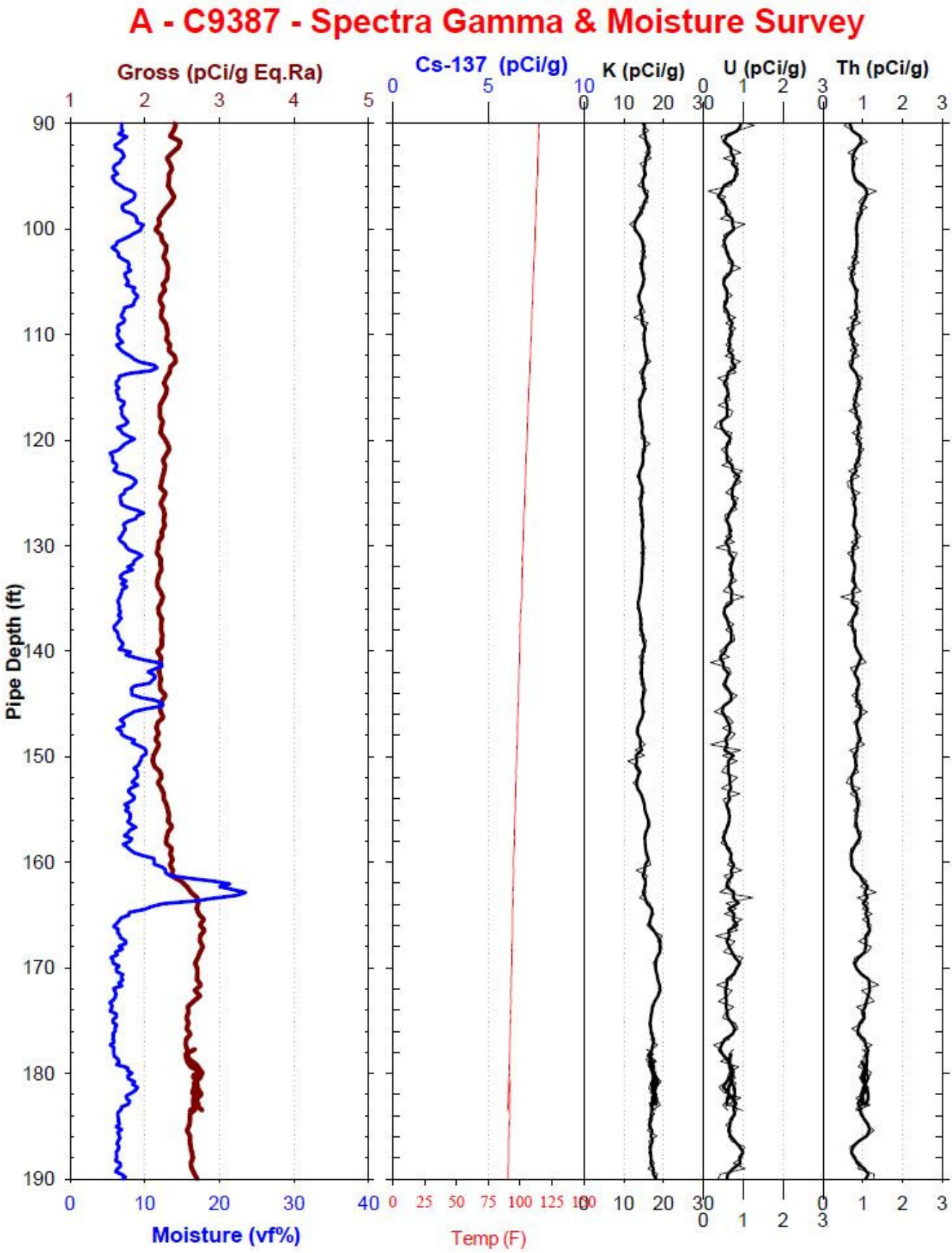
Gamma BGO
Date: Oct 11, 2018 BGO-3
Electronic File: BGO-3_Oct2018-v1.zip

CeBr
Date: Jan 21, 2019
Electronic File: CeBr-1_Jan2019-v1.zip

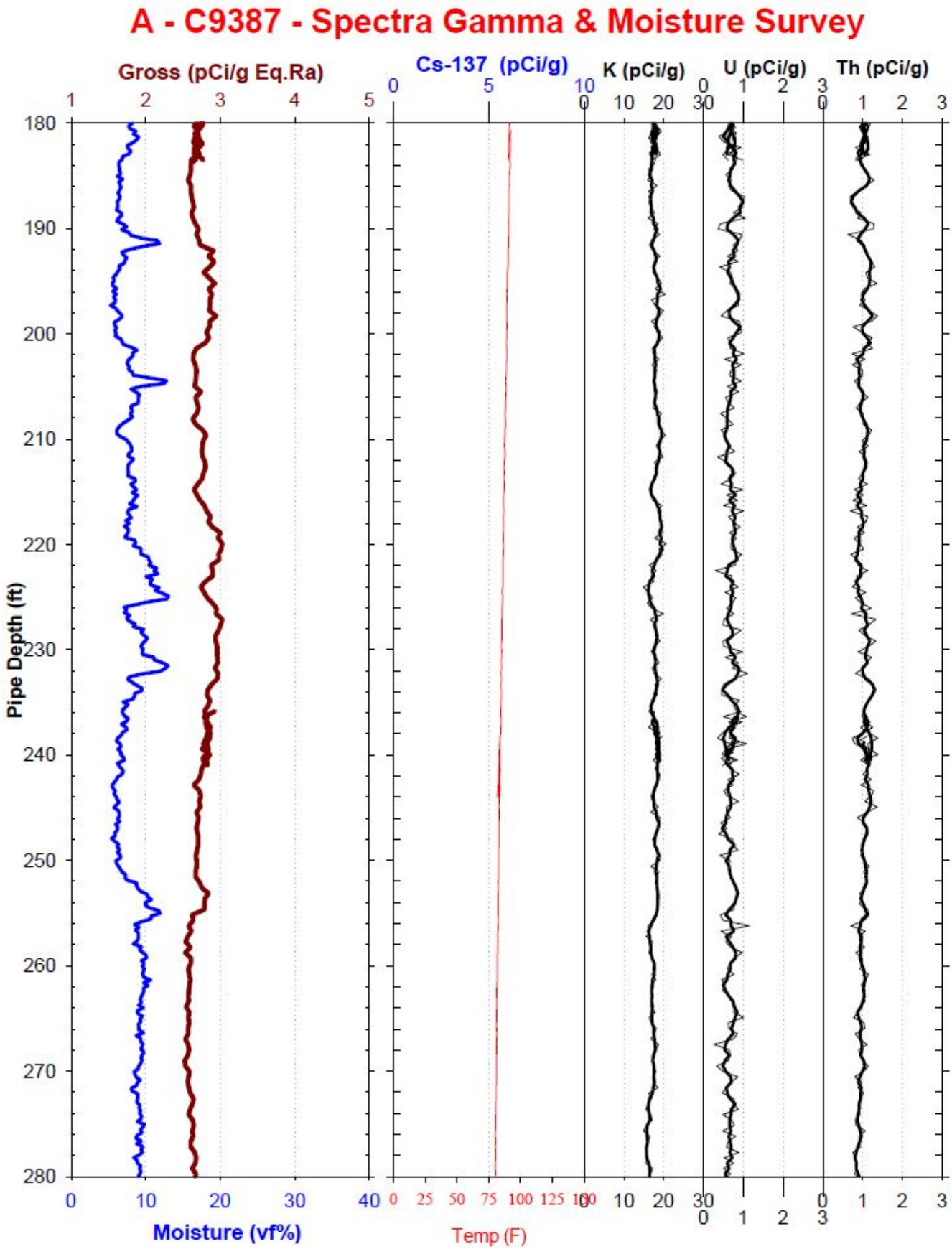
[a]KUT = potassium-40, uranium-238 and thorium-232



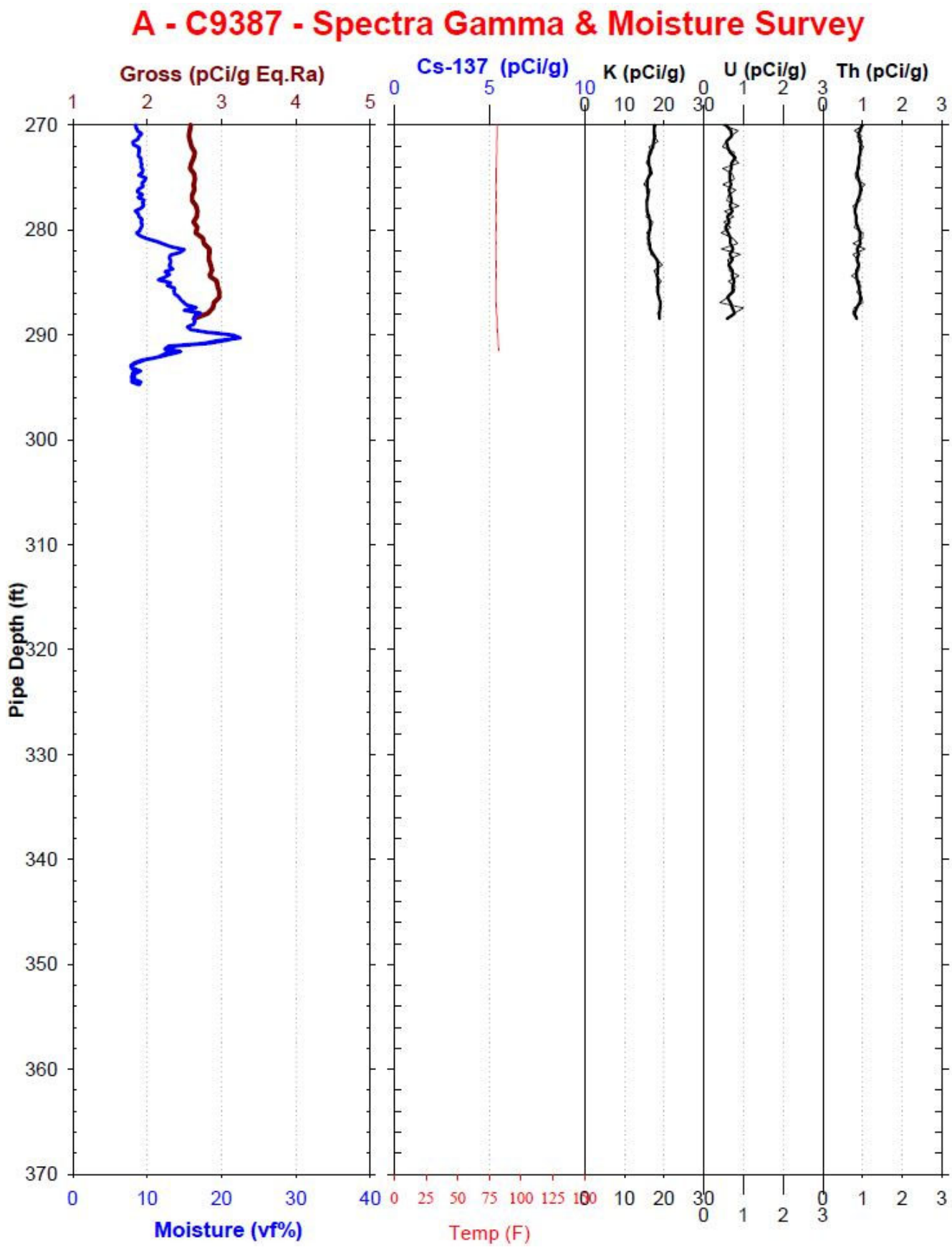
[a]KUT = potassium-40, uranium-238 and thorium-232



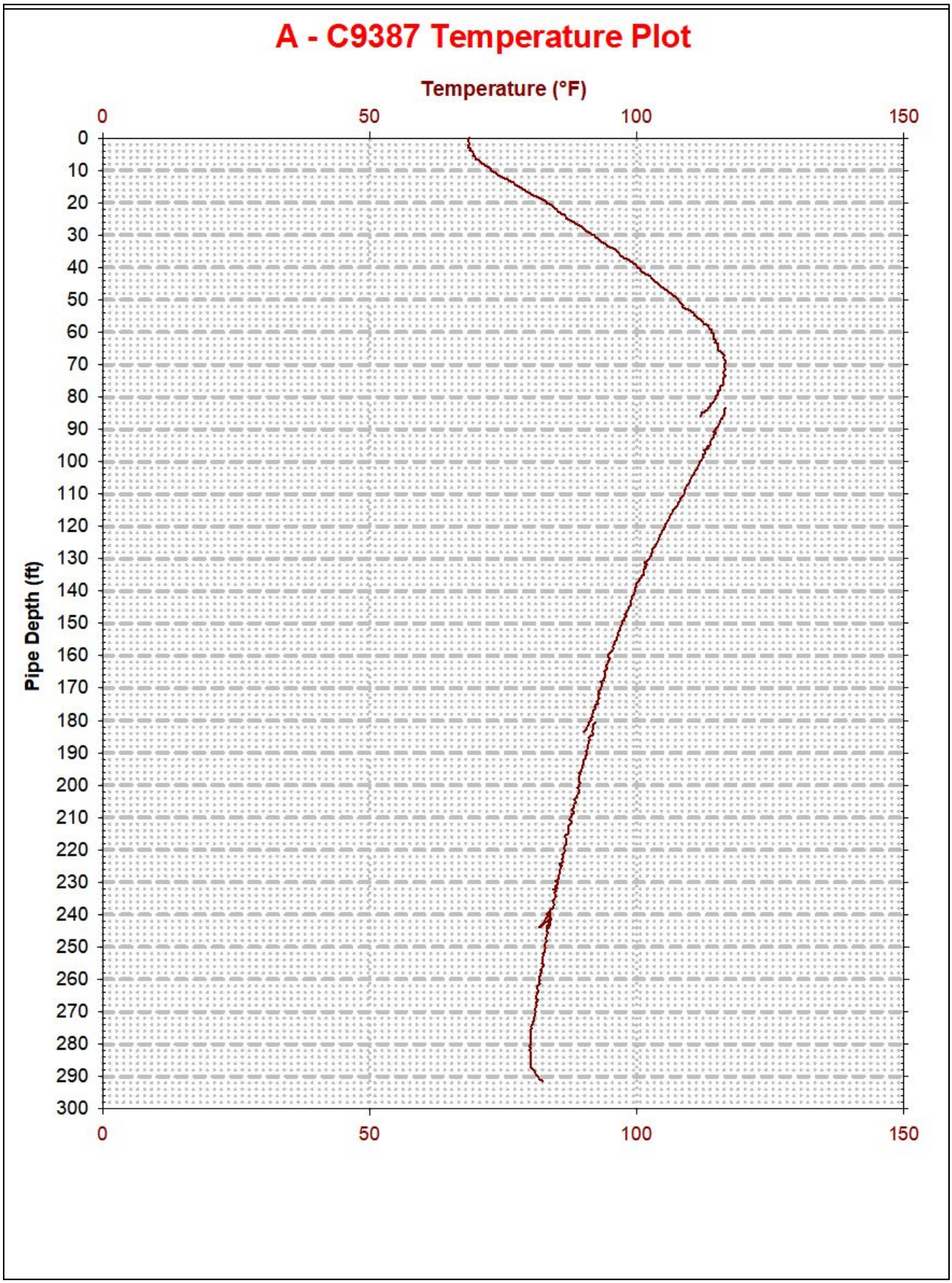
[a]KUT = potassium-40, uranium-238 and thorium-232



[a]KUT = potassium-40, uranium-238 and thorium-232



[a]KUT = potassium-40, uranium-238 and thorium-232


A - C9387 Temperature Plot
Temperature (°F)
0
50
100
150
Pipe Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
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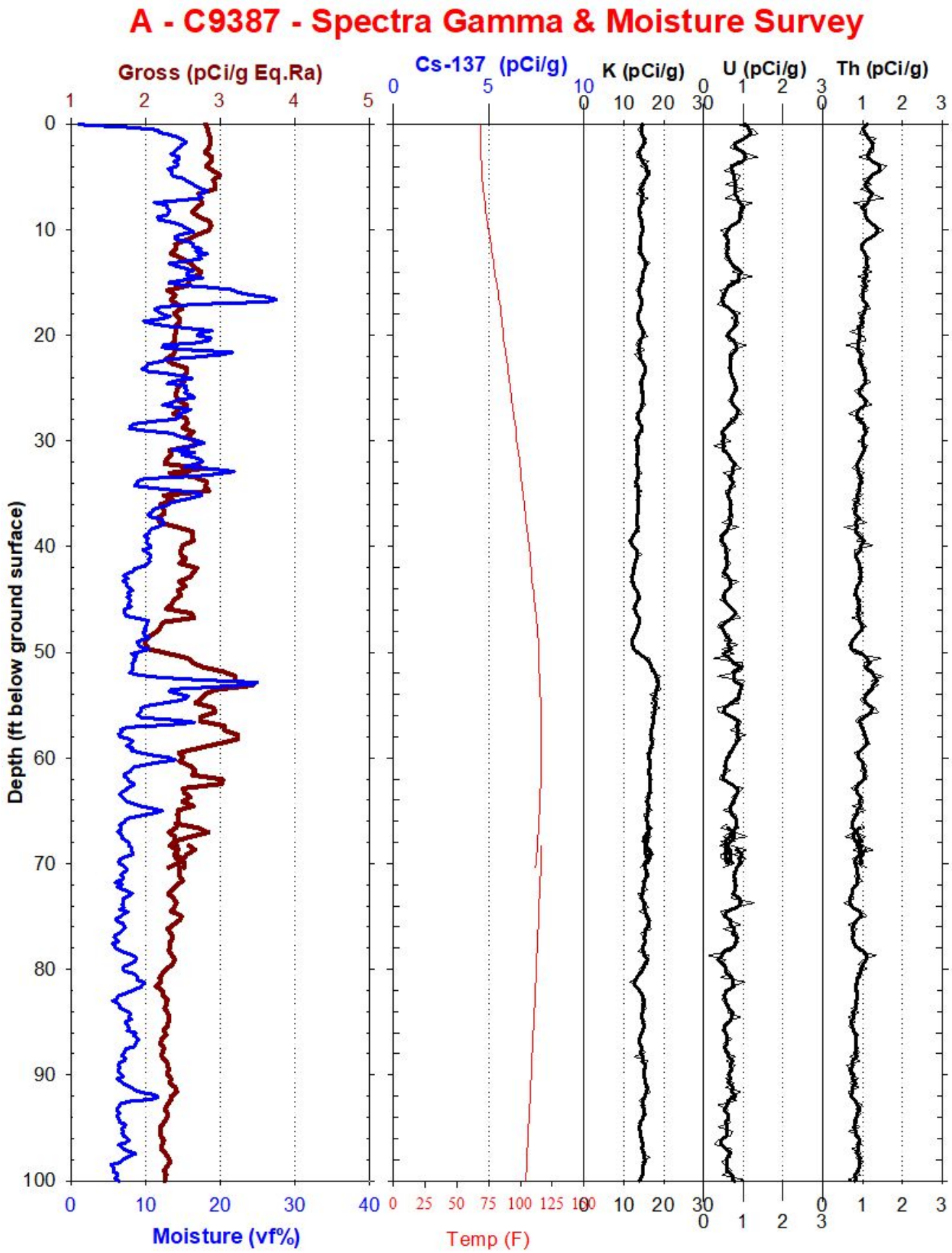
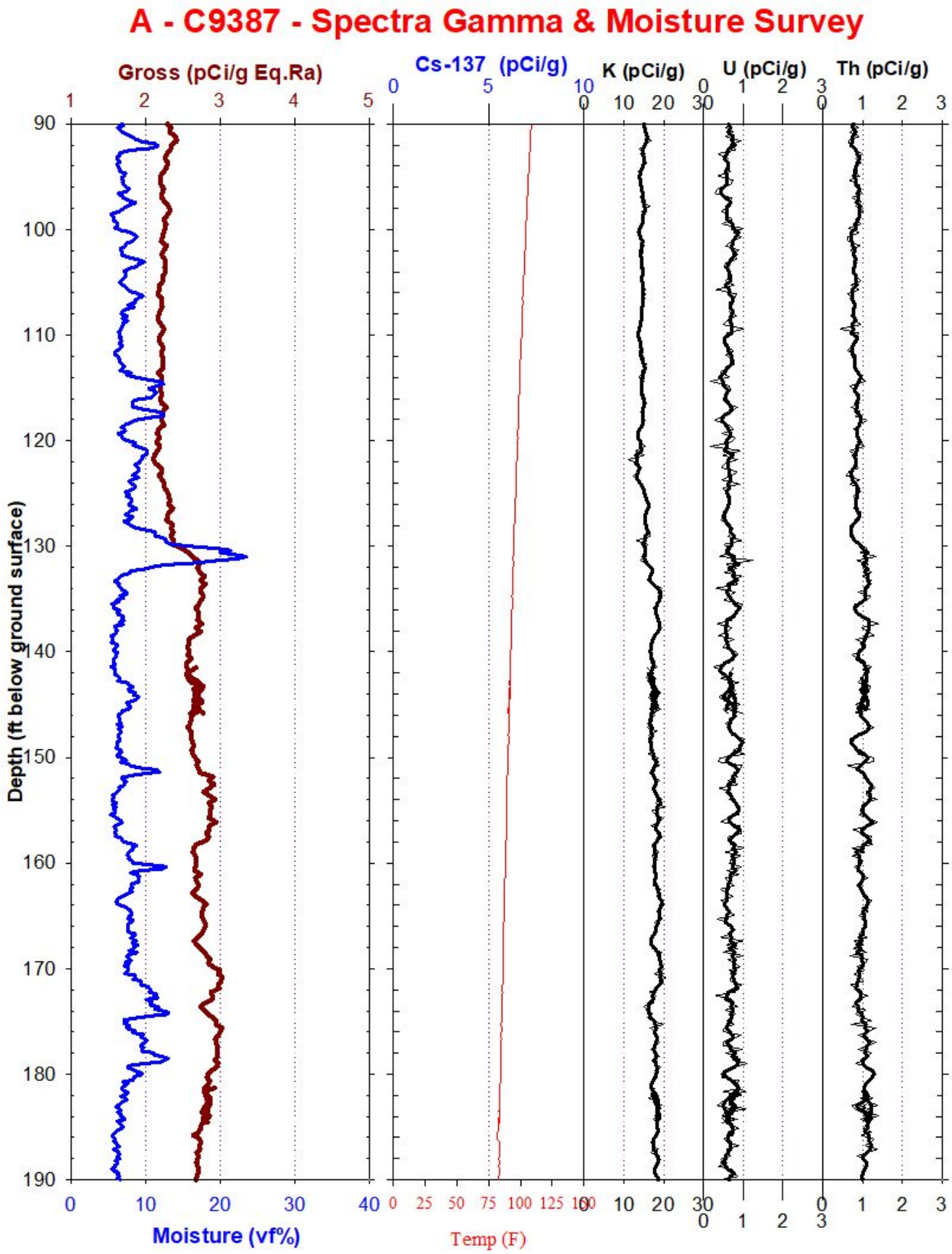
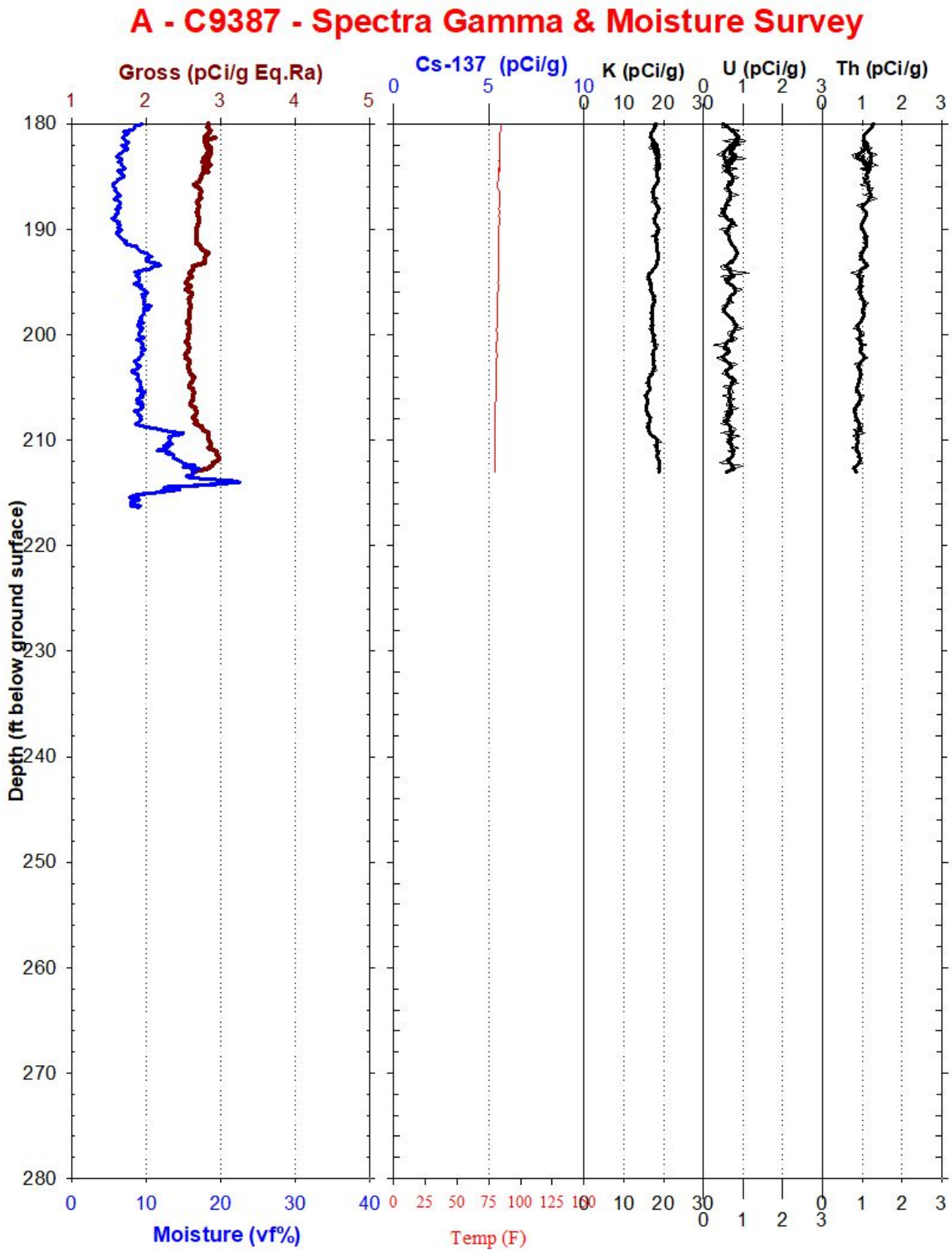
240
250
260
270
280
290
300



[a]KUT = potassium-40, uranium-238 and thorium-232

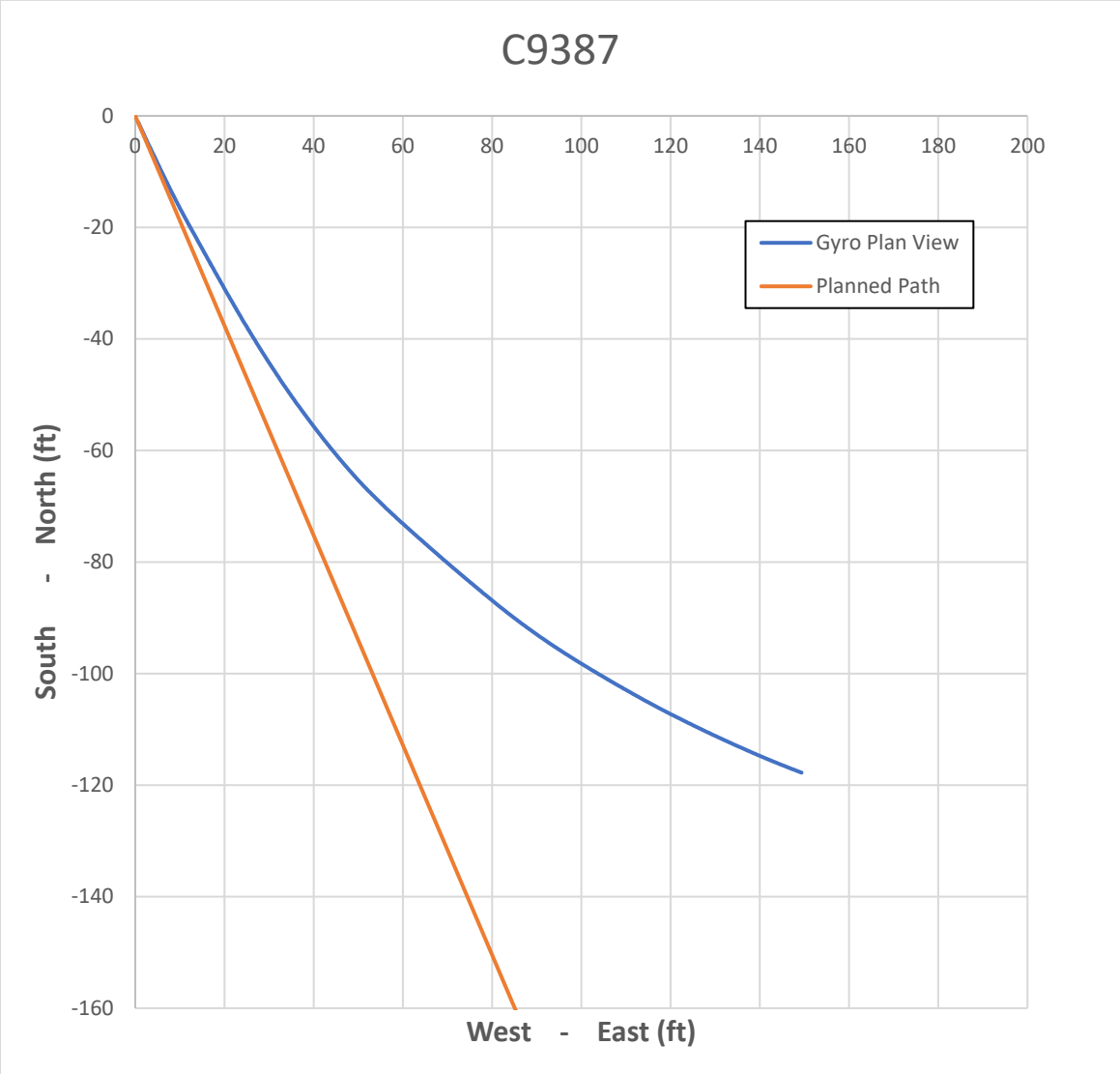


[a]KUT = potassium-40, uranium-238 and thorium-232



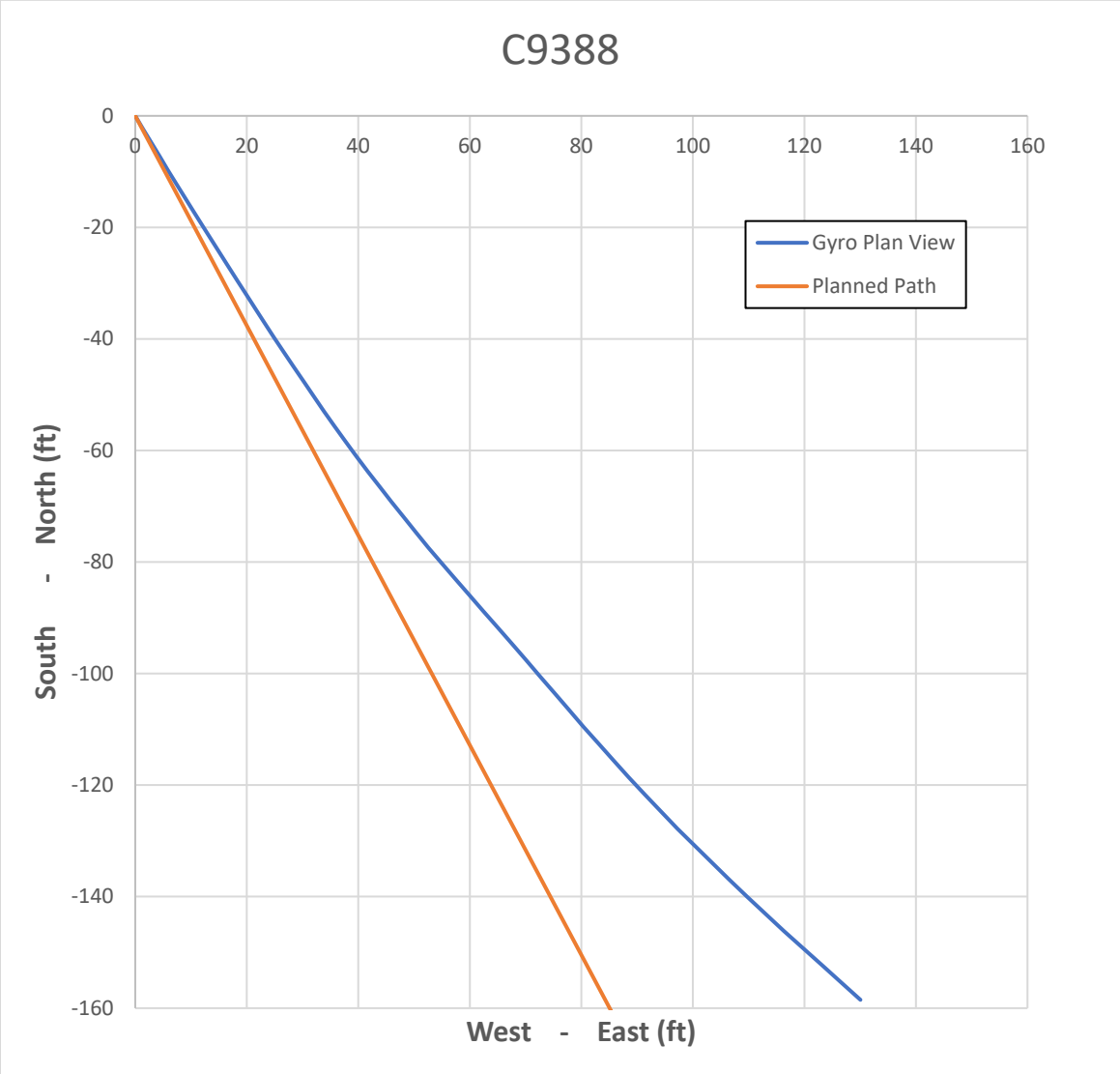
[a]KUT = potassium-40, uranium-238 and thorium-232

C9387 Gyroscope Deviation Plot



The path veered to the east and dip angle decreases with depth.

C9388 Gyroscope Deviation Plot



The path veered to the east and dip angle decreases with depth.

A-Farm C9391 Header Information

Small Diameter –Moisture/Gamma Survey

Log Date: Jan 16 - April 3, 2019 Ref: Ground Surface

Observations

A combination High Energy Resolution gamma CeBr and High Efficiency gamma detector BGO-3 tool was used for the gamma logging (a new CeBr High Resolution gamma detector tool was assembled and calibrated for use in this combination tool). Two sets of KUT[a] plots are provided; one in feet (ft) pipe run and one in ft below ground surface (ft bgs). The CeBr tool shows a concentration of 14 pCi/g of Cs-137 at 0.5 ft below ground surface. The gross gamma threshold is set at 50 keV and therefore responsive to the presence of Cs-137 near the surface.

The moisture measurement is derived from an instrument manufactured by Instro Tek Corporation. The instrument contains a neutron source and a thermal neutron detector. The gauge responds primarily to the surrounding hydrogen, hence water. Moisture values range from 3 to 22%. Moisture values show many thin stringers from 112 to 162 ft pipe run.

The temperature measurement is derived from the Omega Smart IR Temperature probe and run with the moisture tool. This probe measures the surface temperature of a solid or liquid without contact and can measure between -70 to 380°C (-94 to 716°F). Temperature values range from 9.3 °C (48.7 °F) to 47 °C (116.6 °F) with the maximum temperature recorded is 47 °C (116.6 °F) at a depth of 72 ft pipe run.

Plan view plots of direct push gyroscope deviation results from the geophysical logging hole and sampling hole are also included (C9391 and C9392, respectively).

Conclusions

The temperature does not show normal geologic gradient. The temperature profile is indicative of a highly radioactive heat source remote from the borehole.

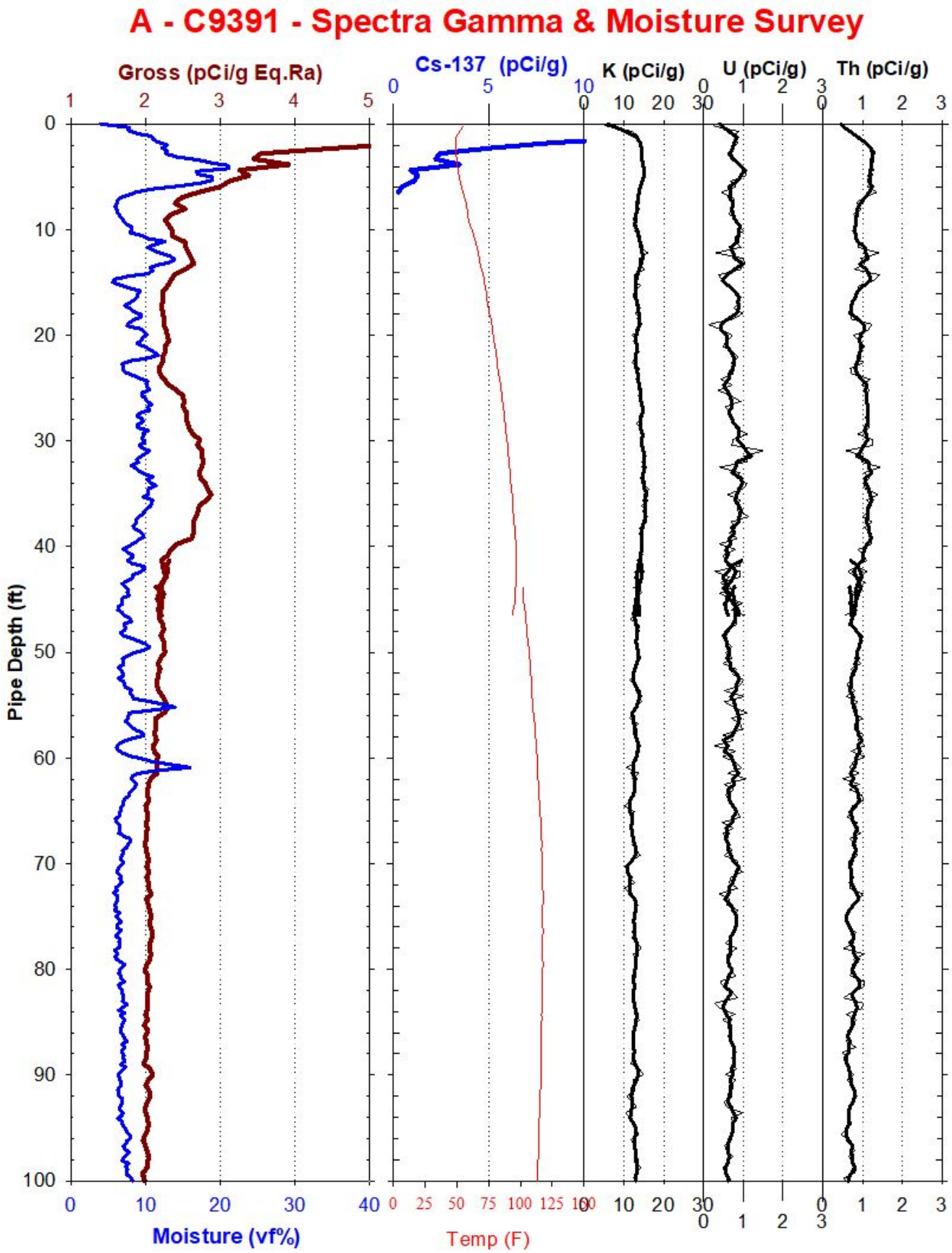
Calibration Certificates

Moisture
Date: Oct 11, 2018
Electronic File: Moist-1_2018-v1.zip

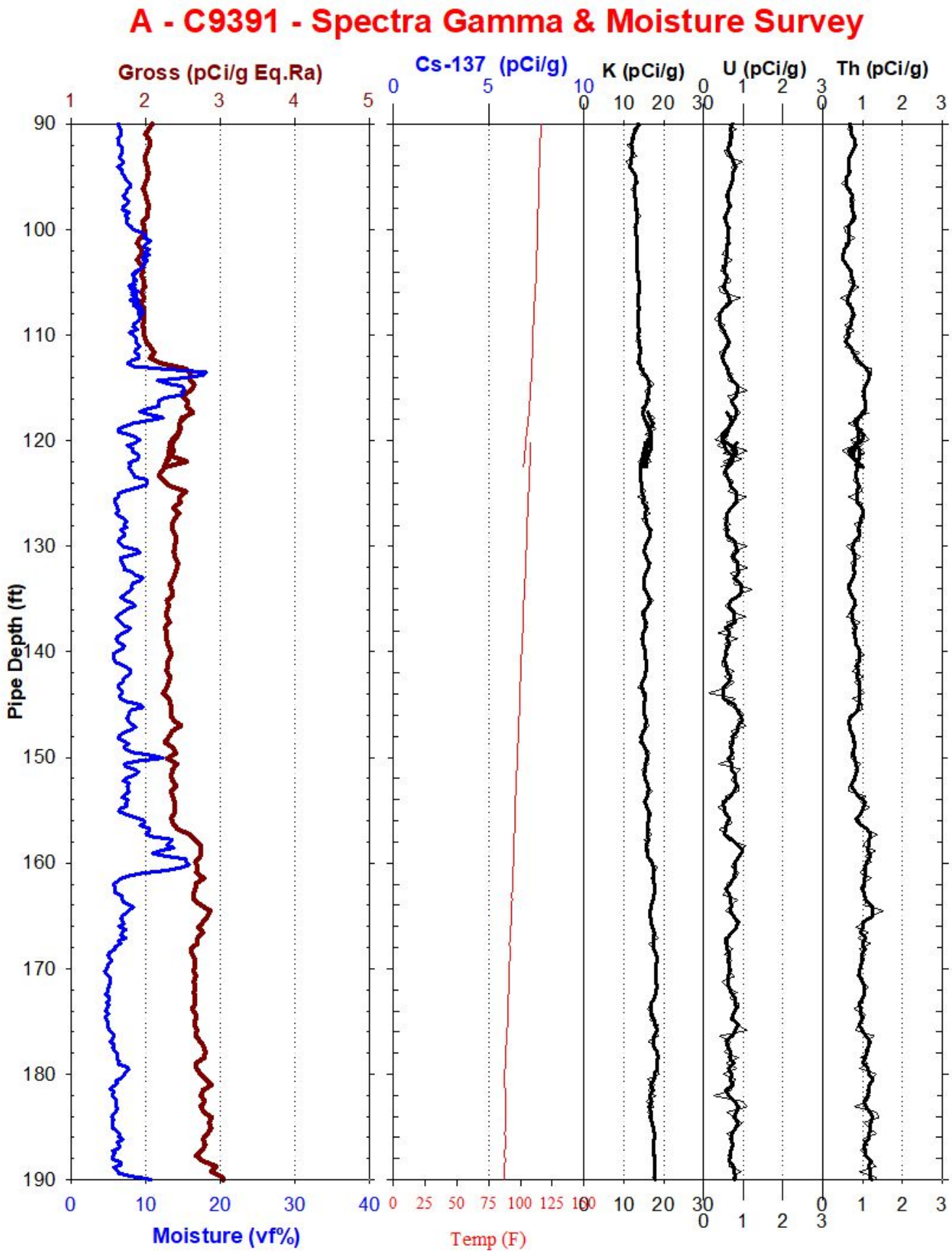
Gamma BGO
Date: Oct 11, 2018 BGO-3
Electronic File: BGO-3_Oct2018-v1.zip

CeBr
Date: Jan 21, 2019
Electronic File: CeBr-1_Jan2019-v1.zip

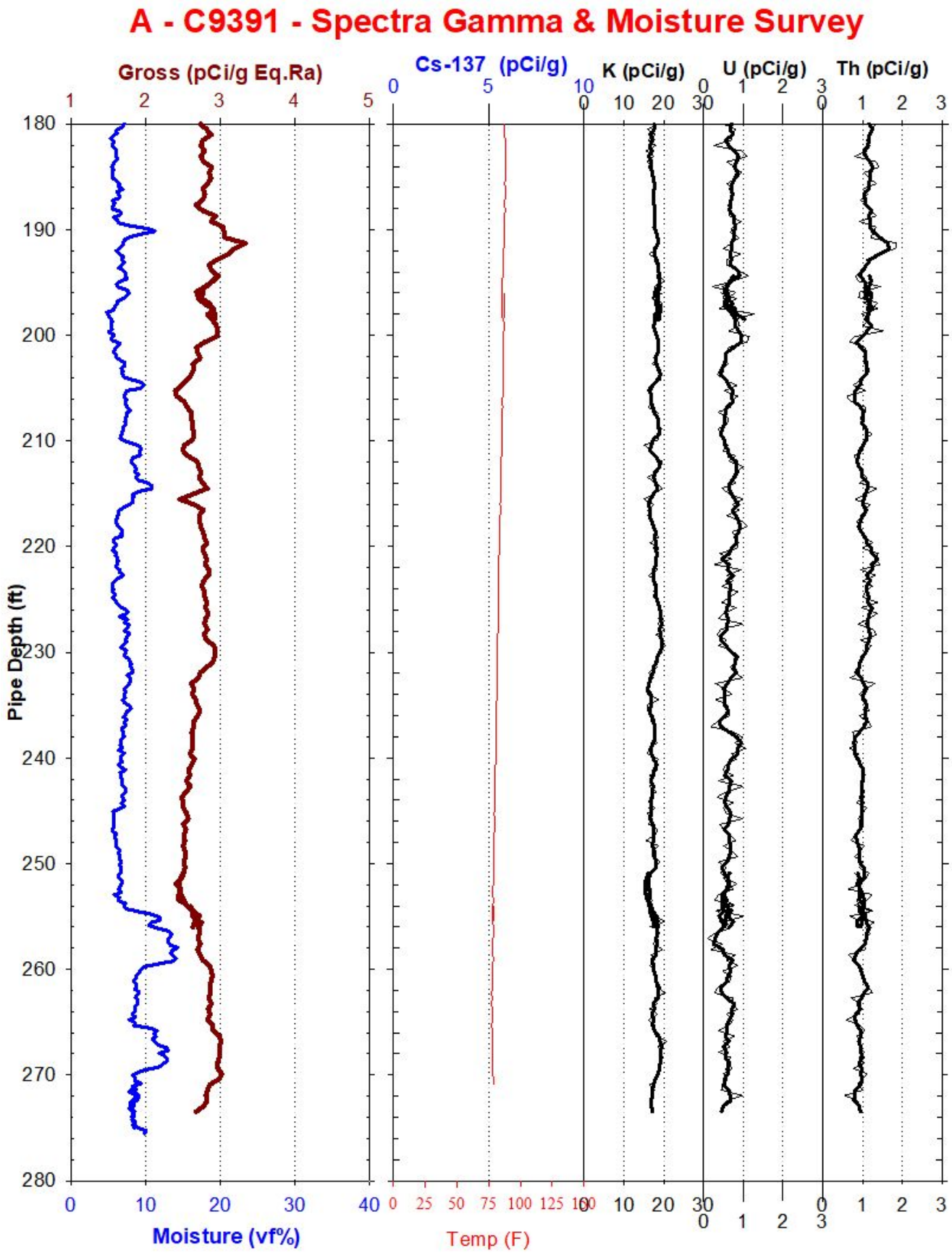
[a]KUT = potassium-40, uranium-238 and thorium-232



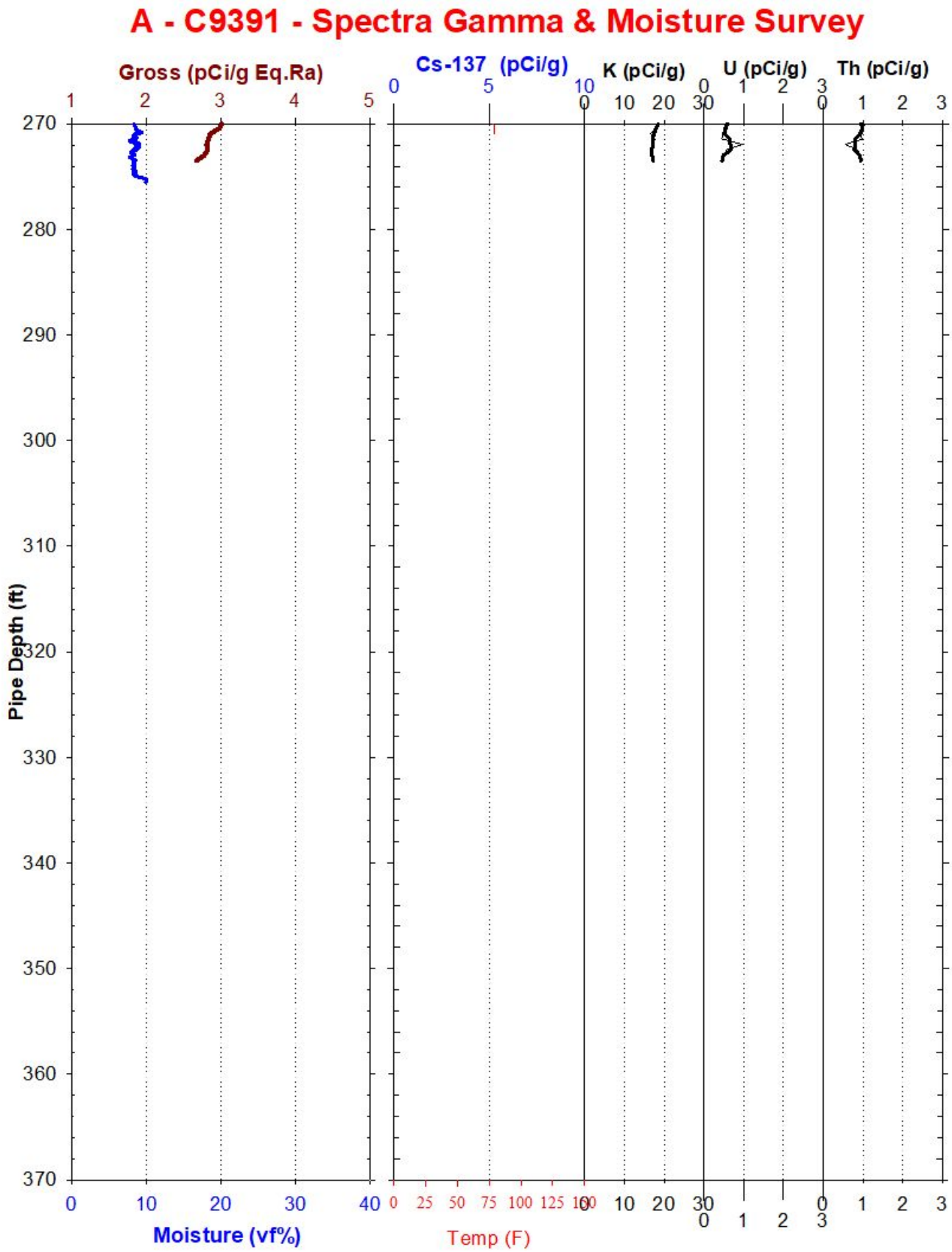
[a]KUT = potassium-40, uranium-238 and thorium-232



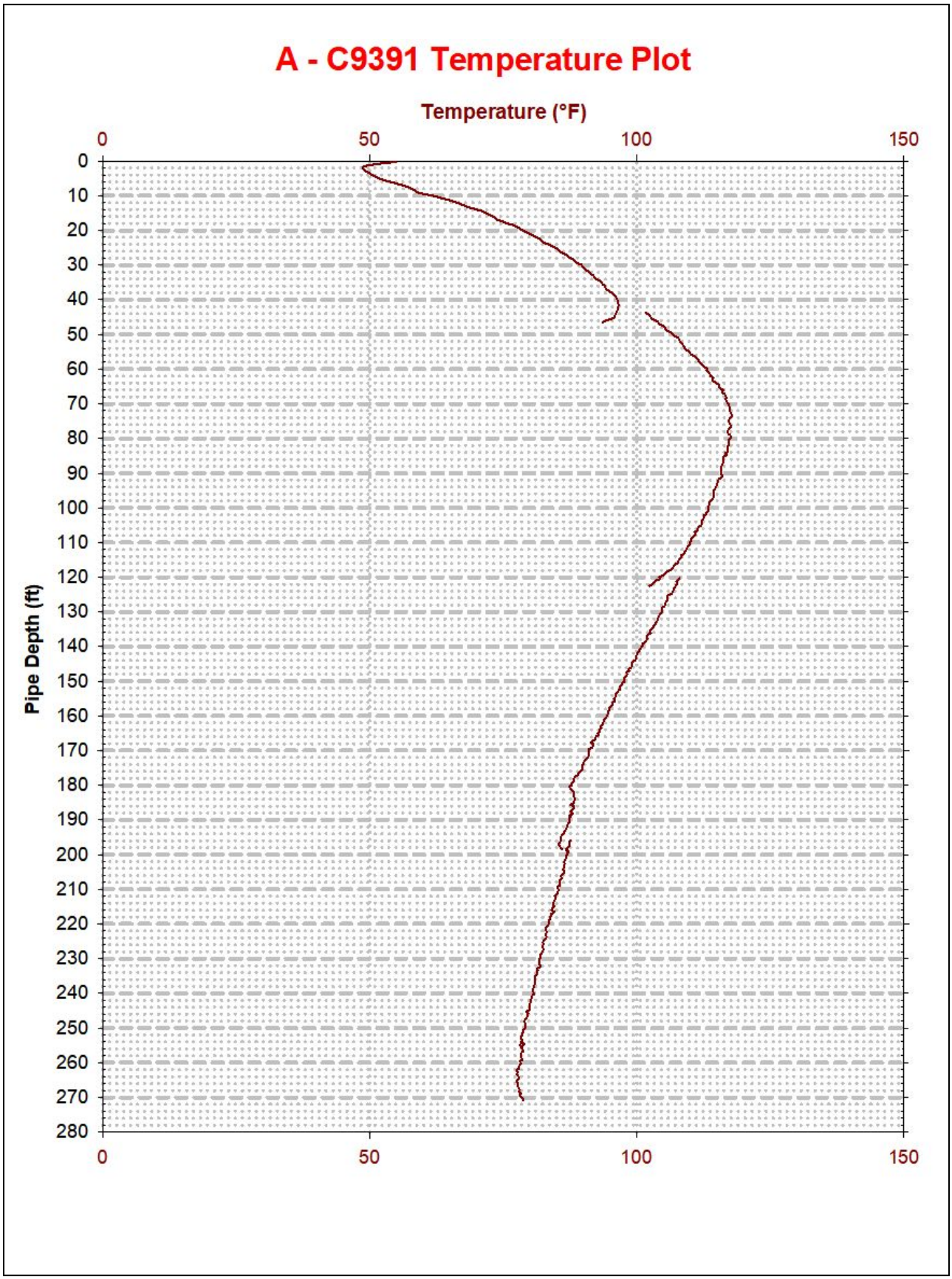
[a]KUT = potassium-40, uranium-238 and thorium-232



[a]KUT = potassium-40, uranium-238 and thorium-232



[a]KUT = potassium-40, uranium-238 and thorium-232


A - C9391 Temperature Plot
Temperature (°F)
0
50
100
150
Pipe Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
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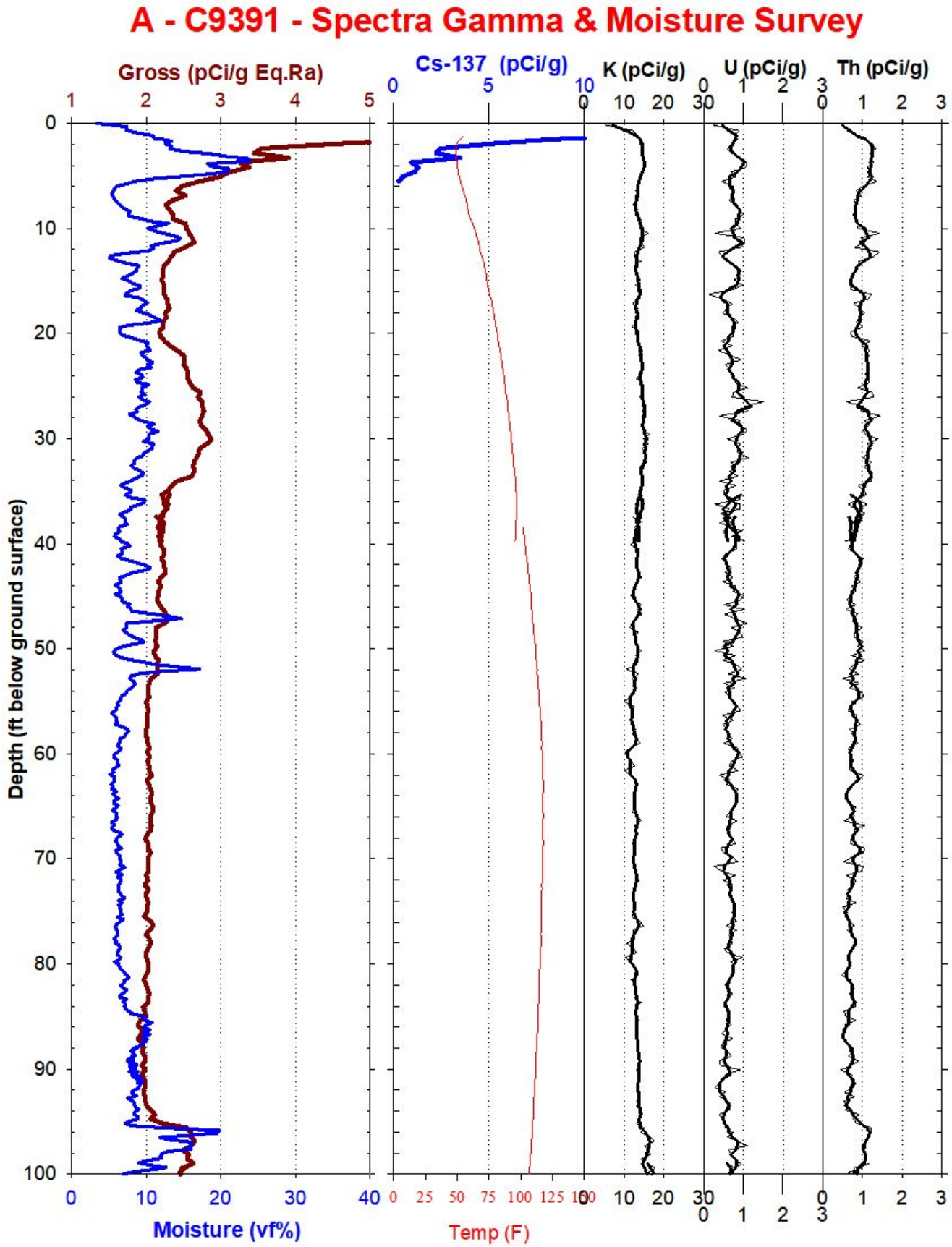
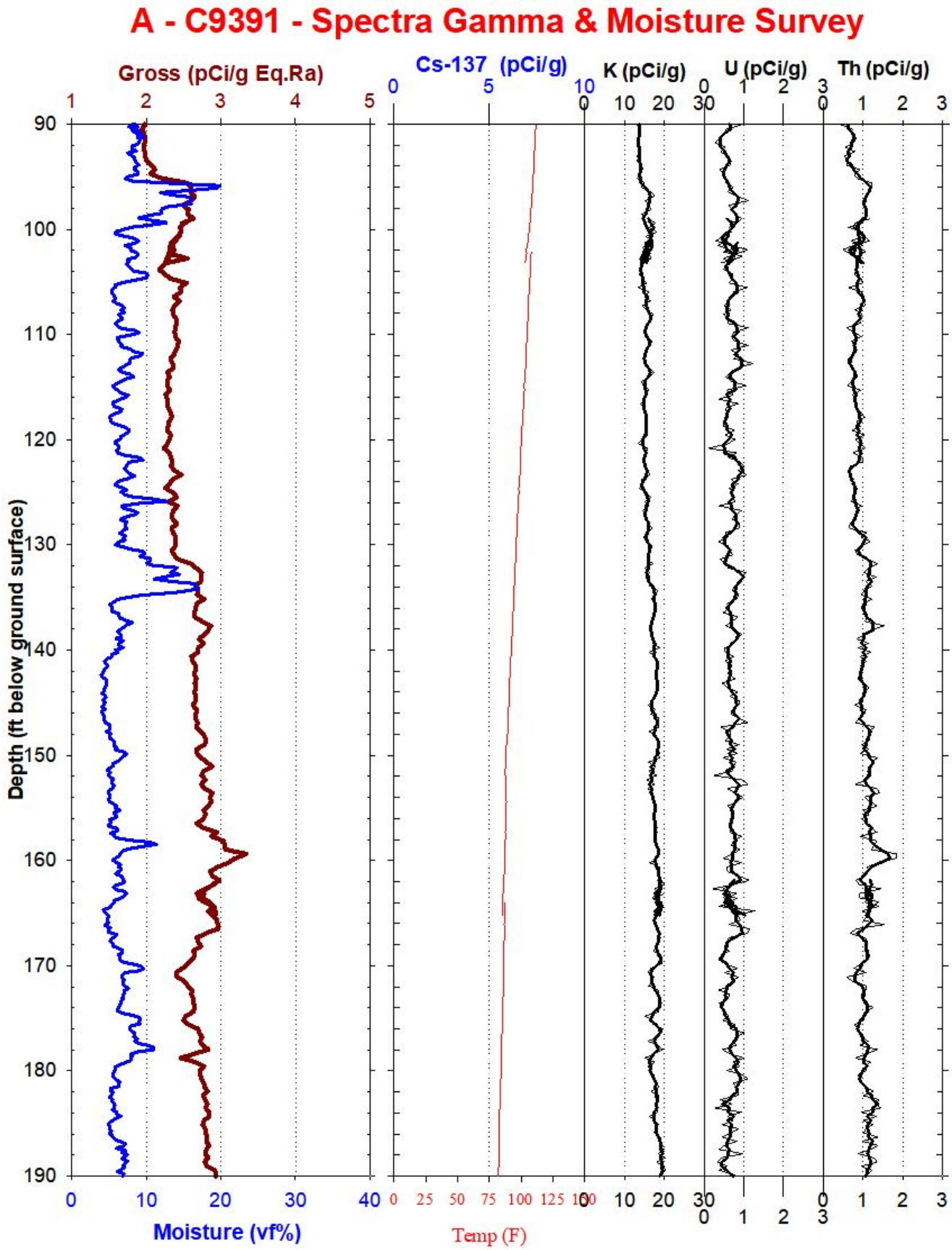
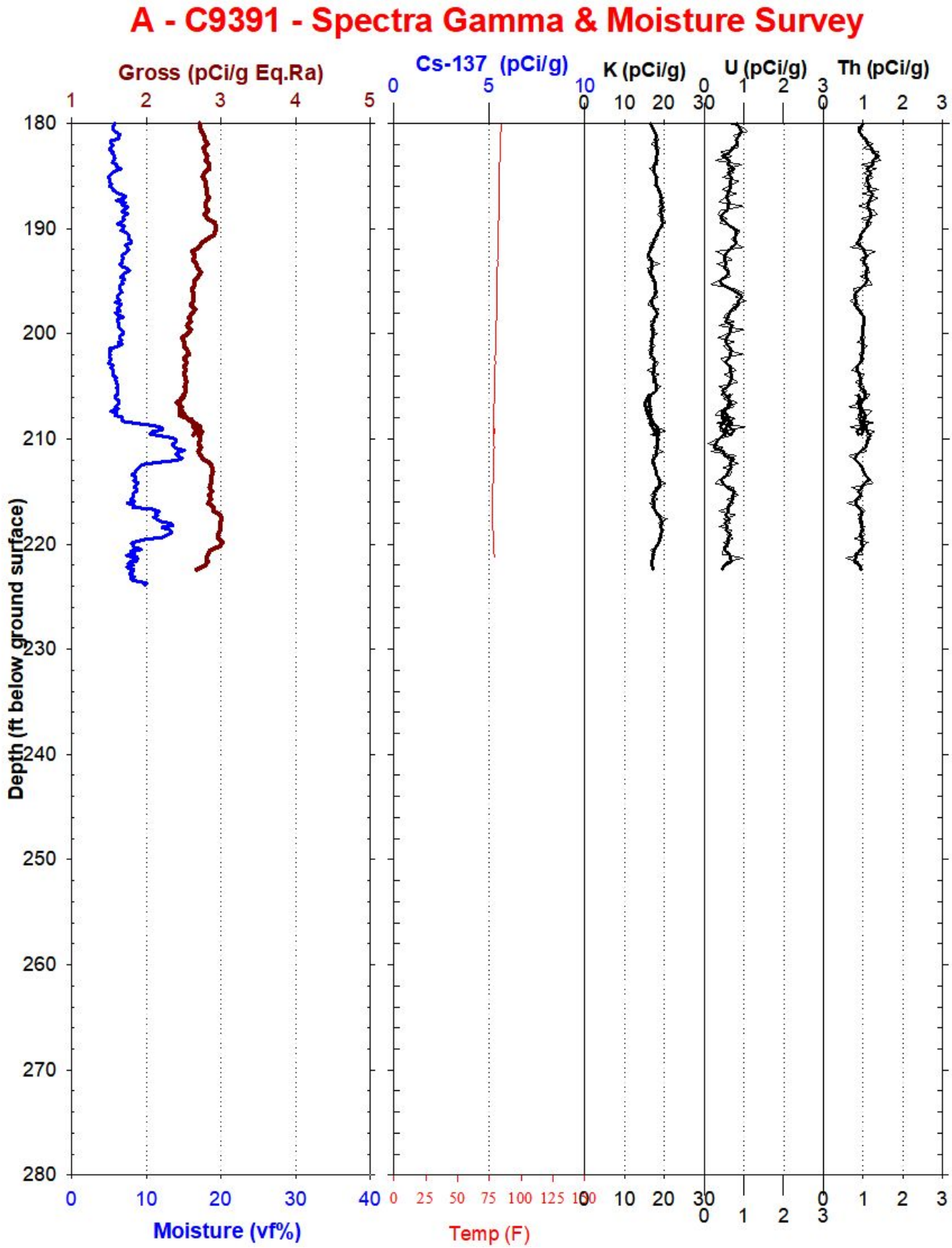
230
240
250
260
270
280



[a]KUT = potassium-40, uranium-238 and thorium-232

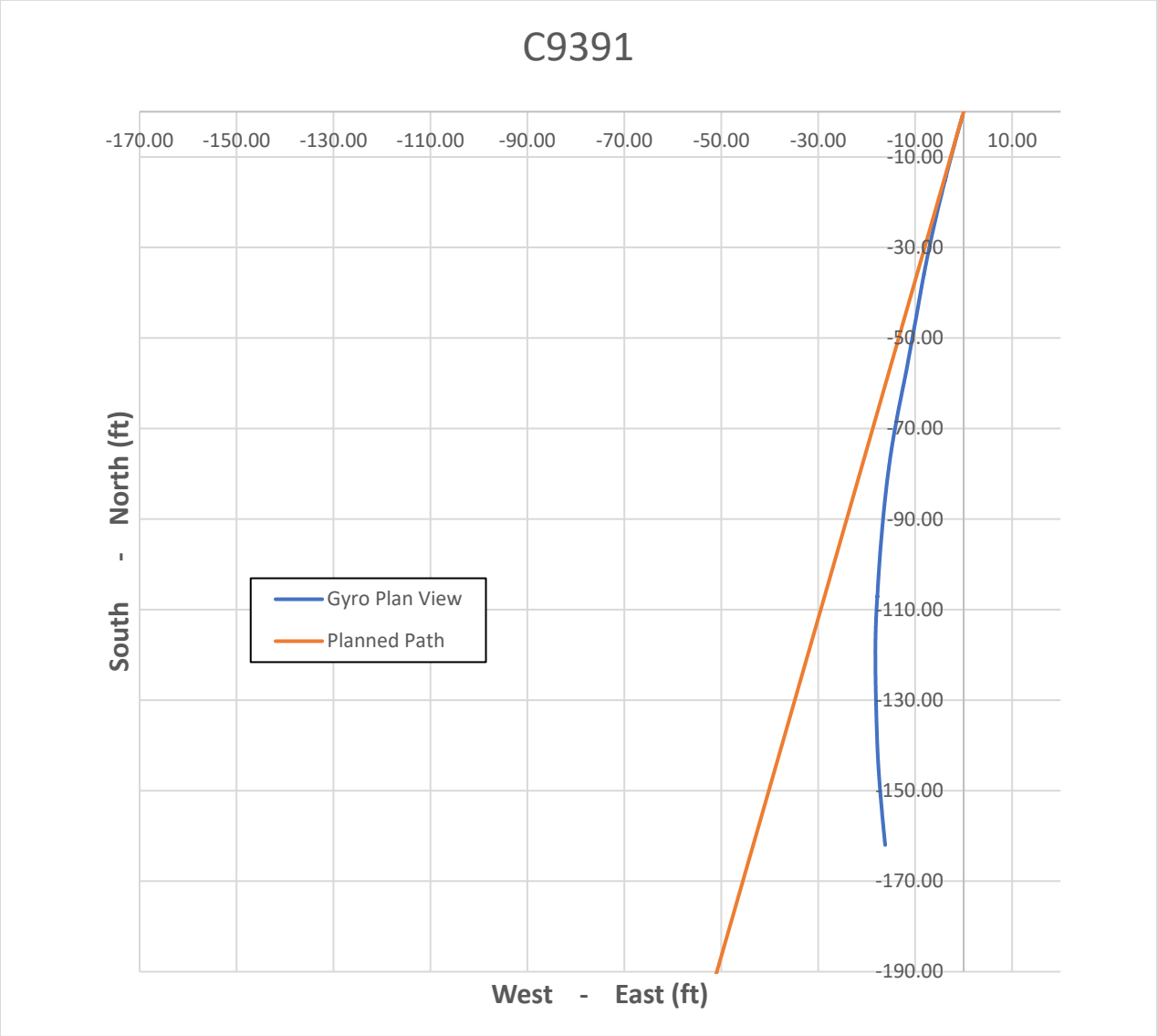


[a]KUT = potassium-40, uranium-238 and thorium-232



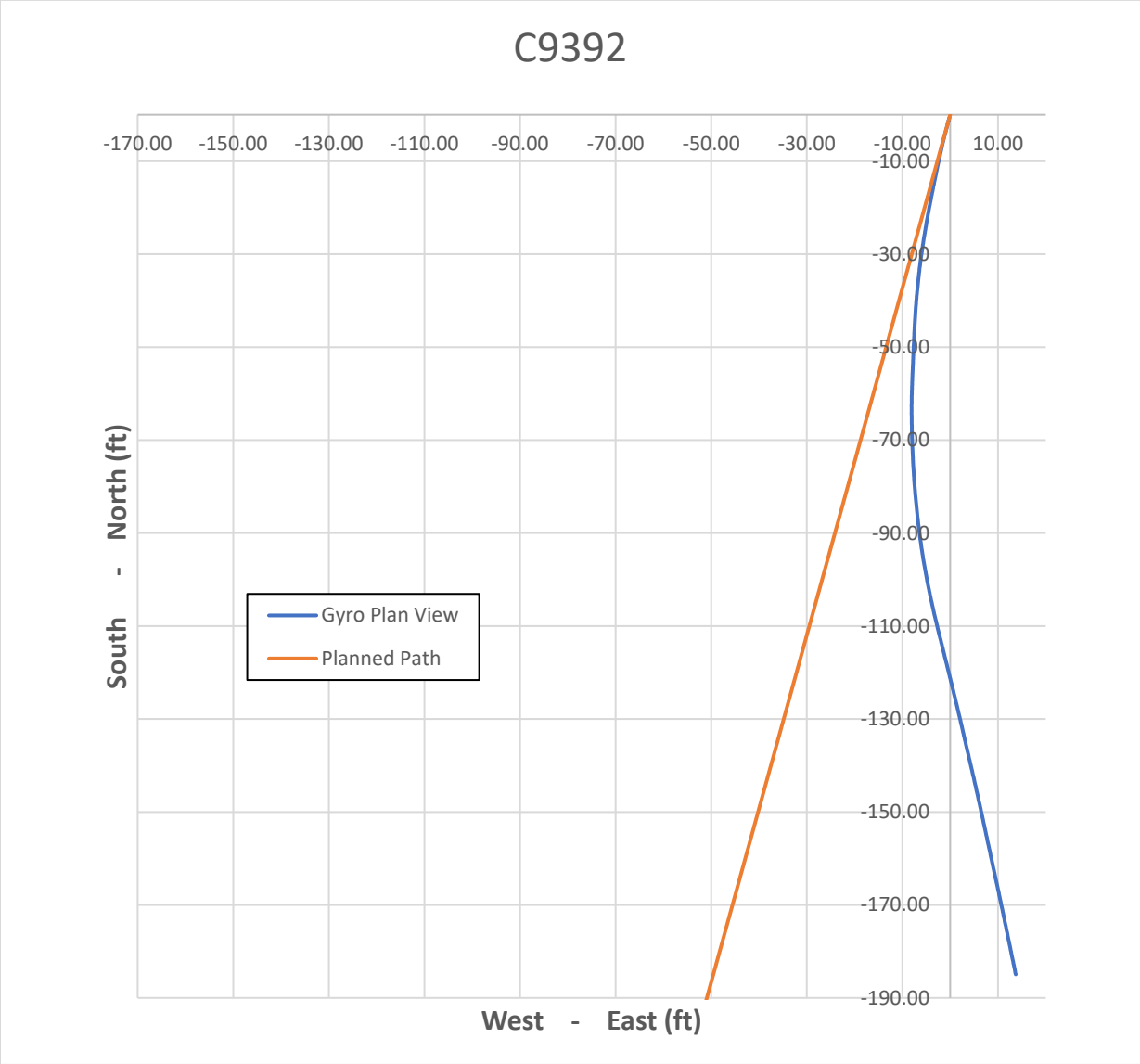
[a]KUT = potassium-40, uranium-238 and thorium-232

C9391 Gyroscope Deviation Plot



The observed direct push path veered off to the east, and the dip angle rose a few degrees towards horizontal.

C9392 Gyroscope Deviation Plot



The observed direct push path veered off to the east, and the dip angle rose a few degrees towards horizontal.

A-Farm C9393 Header Information

Small Diameter –Moisture/Gamma Survey

Log Date: Sep 11 - Oct 23, 2018 Depth Ref: Ground Surface

Observations

High Efficiency gamma detector BGO-3 tool was used to log this direct push. Two sets of KUT[a] plots are provided; one in feet (ft) pipe run and one in ft below ground surface (ft bgs). The BGO tool is only calibrated for Gross gamma and KUT. The gross gamma threshold is set at 50 keV and therefore responsive to the presence of Cs-137. The concentration of Cs-137 observed from 2 ft to surface is estimated to be less than 15 pCi/g at maximum value with the highest concentrations of Cs-137 at the surface, as observed with the BGO-3 data.

The moisture measurement is derived from an instrument manufactured by Instro Tek Corporation. The instrument contains a neutron source and a thermal neutron detector. The gauge responds primarily to the surrounding hydrogen, hence water. Moisture values range from 3 to 52%.

The temperature measurement is derived from the Omega Smart IR Temperature probe and run with the moisture tool. This probe measures the surface temperature of a solid or liquid without contact and can measure between -70 to 380°C (-94 to 716°F). Temperature values range from 23.5 °C (74.3 °F) to 38.3 °C (100.9 °F) with the maximum temperature recorded is 38.3 °C (100.9 °F) at a depth of 74 ft pipe run.

Plan view plots of direct push gyroscope deviation results from the geophysical logging hole and sampling hole are also included (C9393 and C9394, respectively).

Conclusions

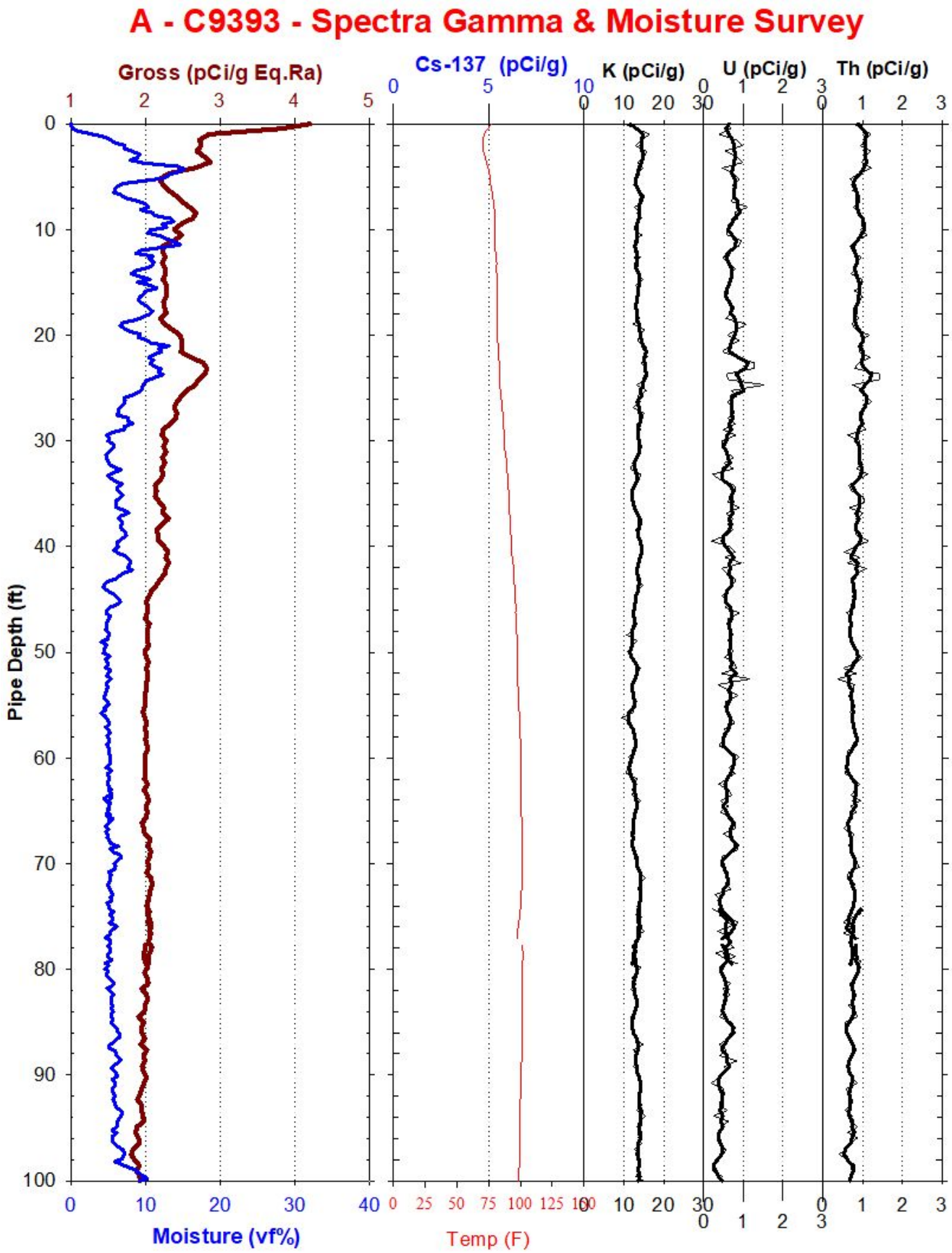
The 52% moisture values are unreasonable, and not possible from water filled pore structure. It is thought that there is a high neutron capture cross section contaminant (such as nitrate) over the depth interval 287 to 289 ft pipe run, where the 52% values are reached. The temperature does not show normal geologic gradient. The temperature profile is indicative of a highly radioactive heat source remote from the borehole.

Calibration Certificates

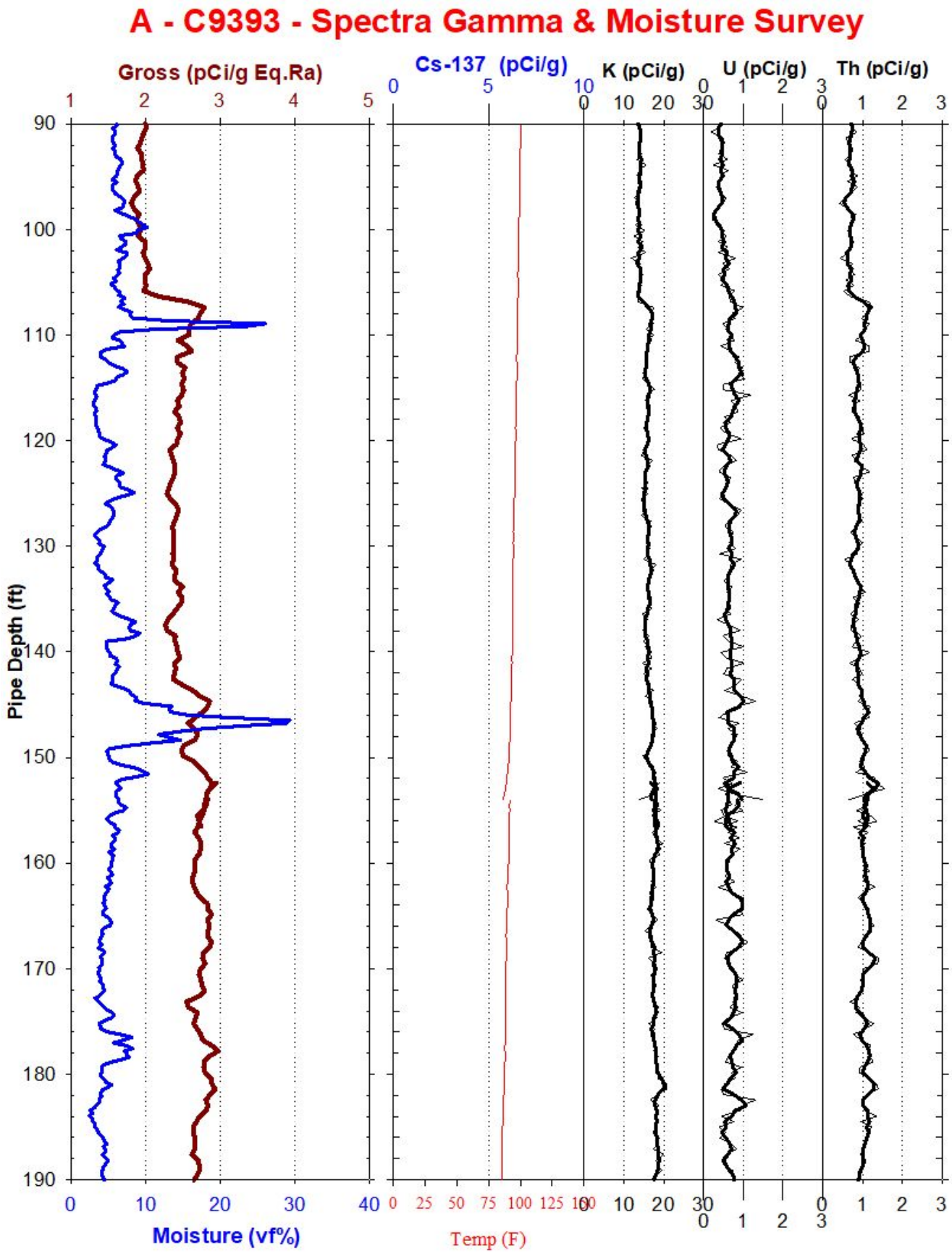
Moisture
Date: June 20, 2018
Electronic File: Moist-1_2018-v1.zip

Gamma BGO
Date: Oct 11, 2018 BGO-3
Electronic File: BGO-3_Oct2018-v1.zip

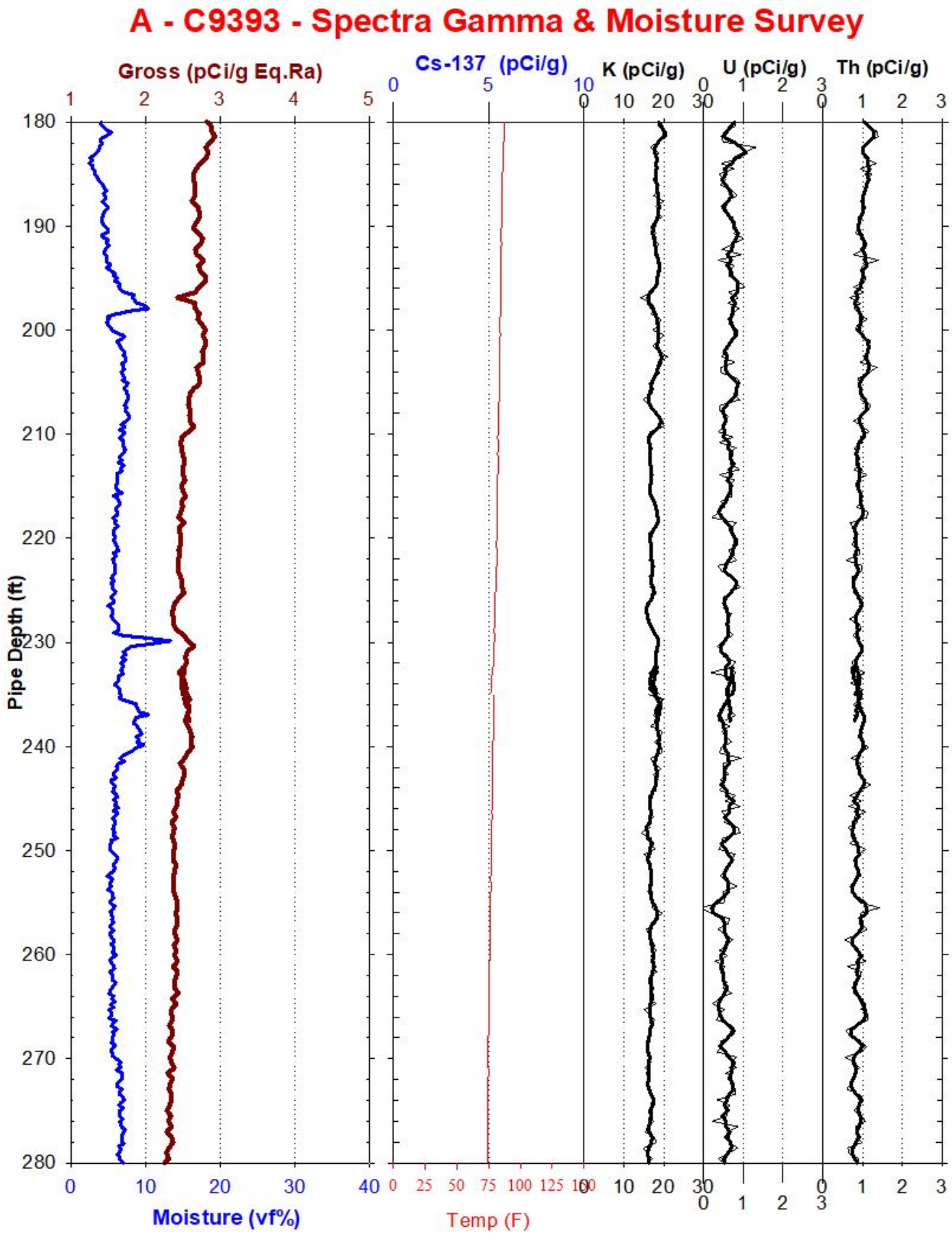
[a]KUT = potassium-40, uranium-238 and thorium-232



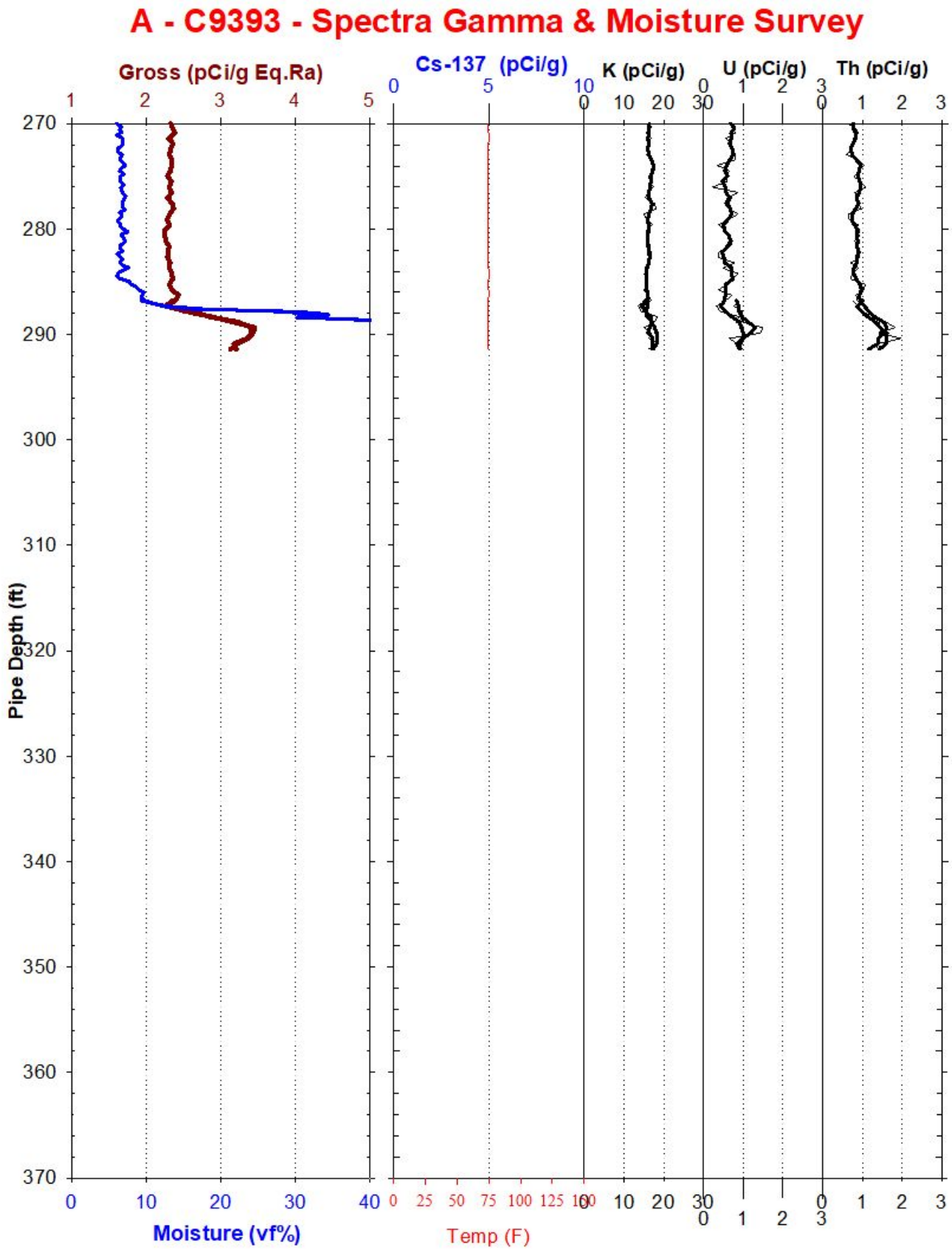
[a]KUT = potassium-40, uranium-238 and thorium-232



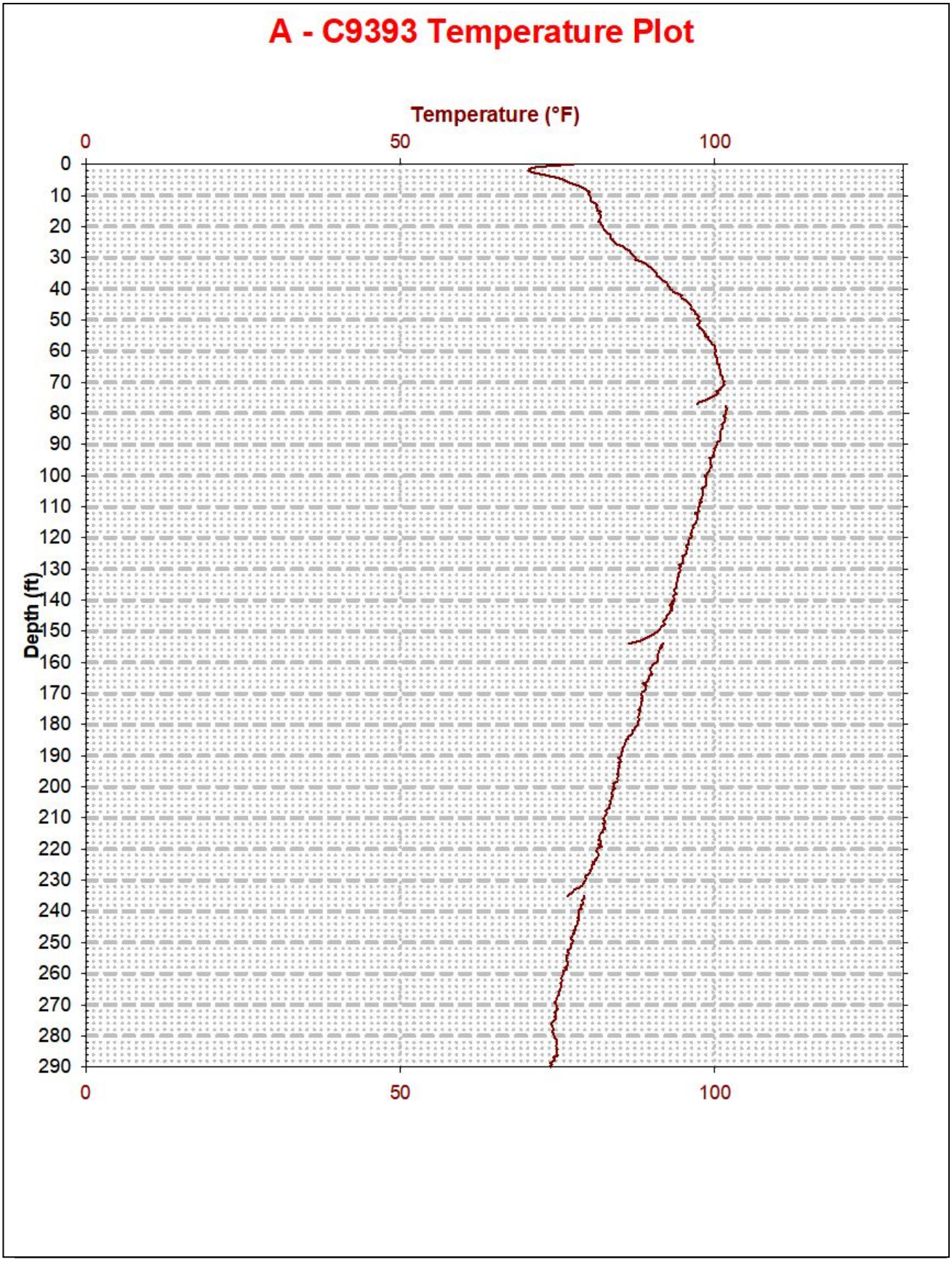
[a]KUT = potassium-40, uranium-238 and thorium-232

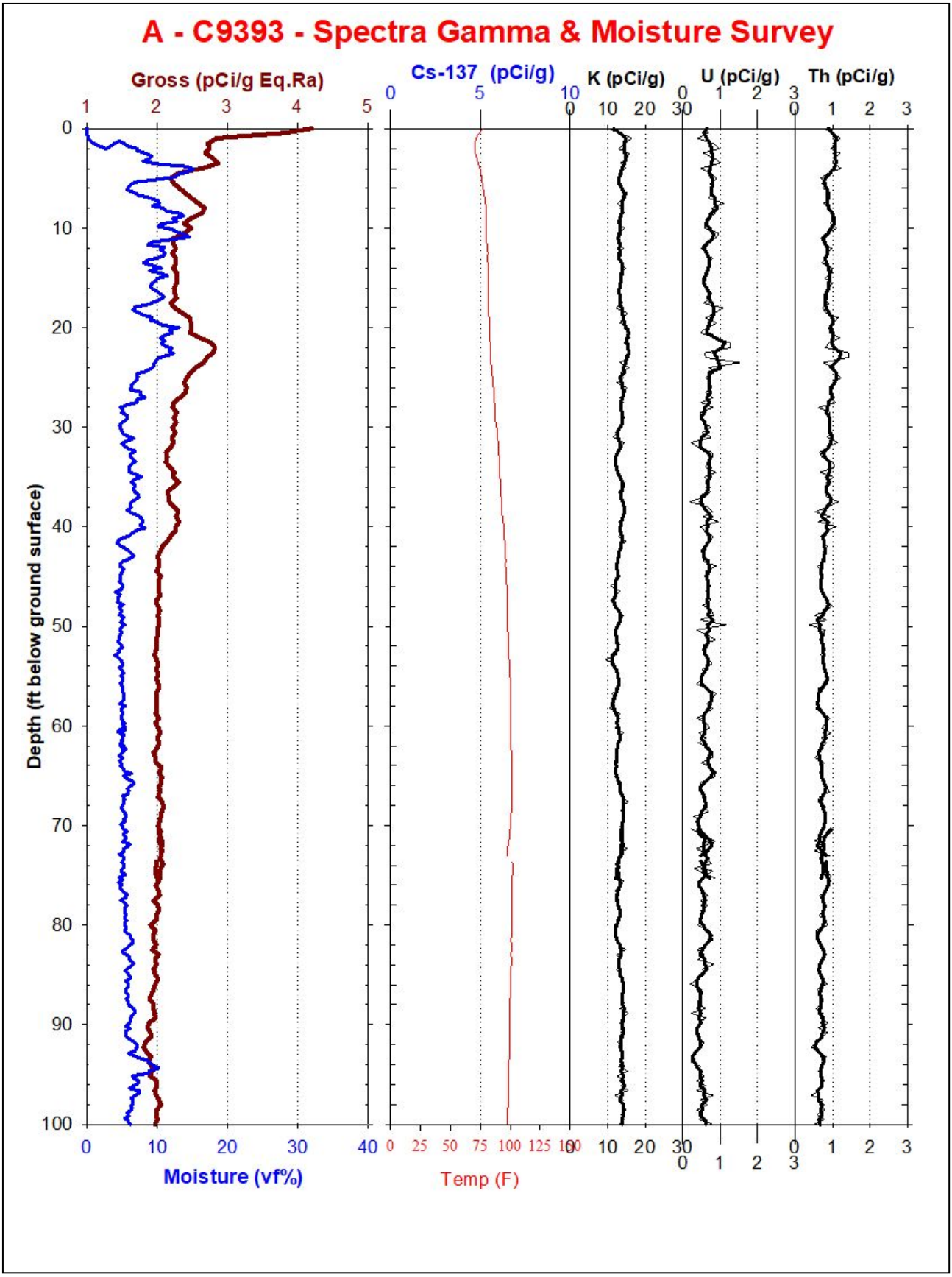


[a]KUT = potassium-40, uranium-238 and thorium-232

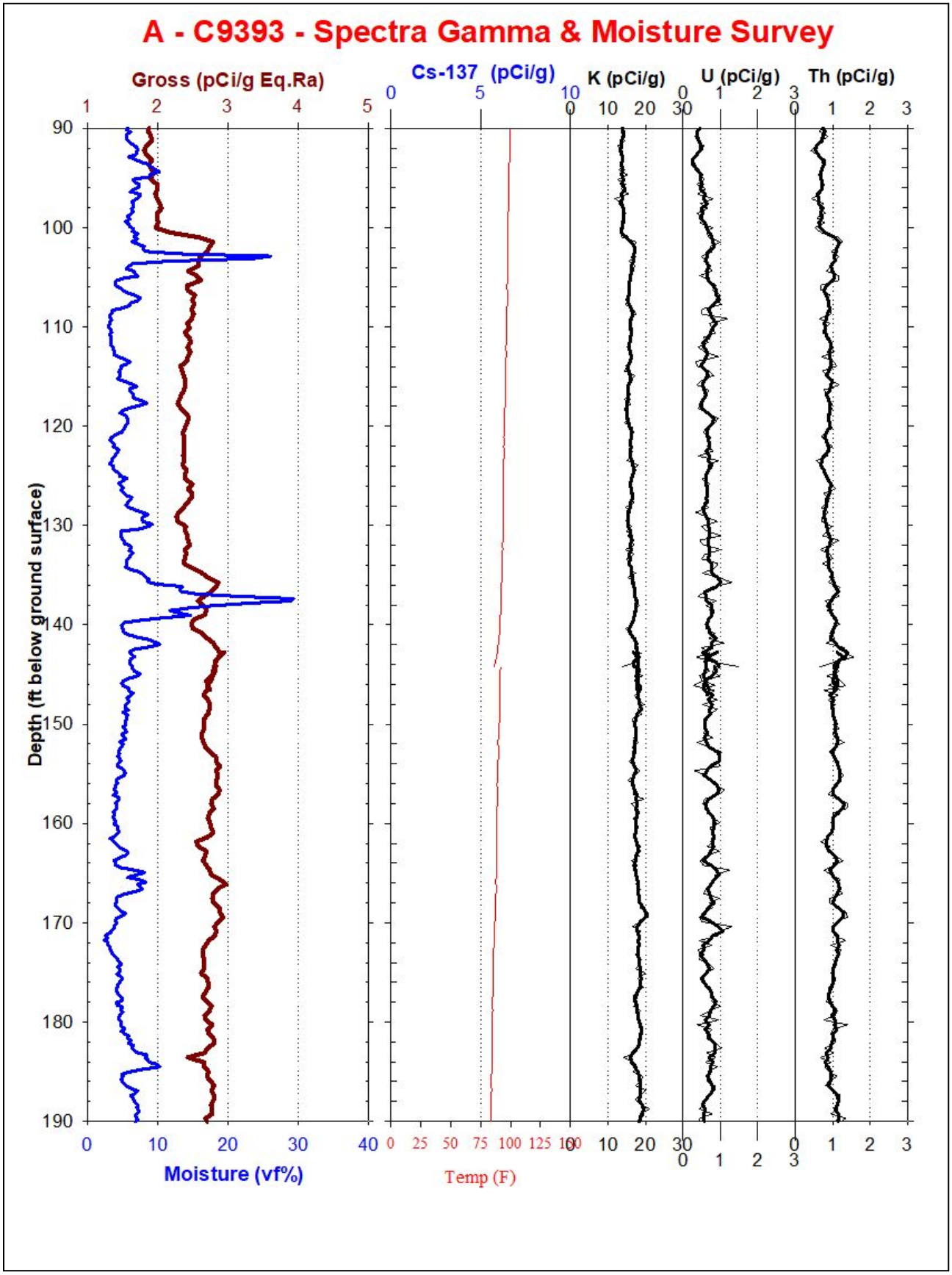


[a]KUT = potassium-40, uranium-238 and thorium-232

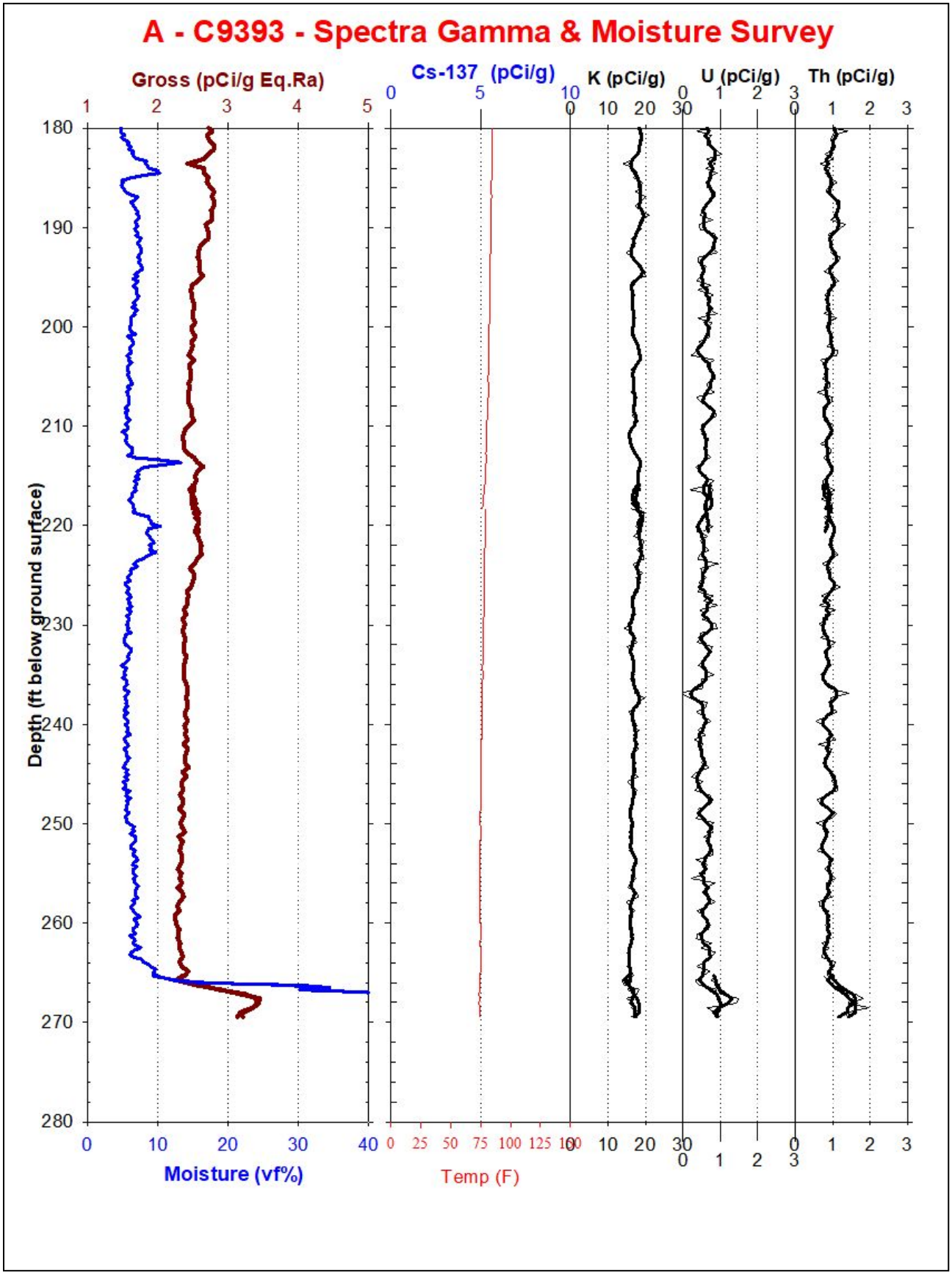

A - C9393 Temperature Plot
Temperature (°F)
0
50
100
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290



[a]KUT = potassium-40, uranium-238 and thorium-232

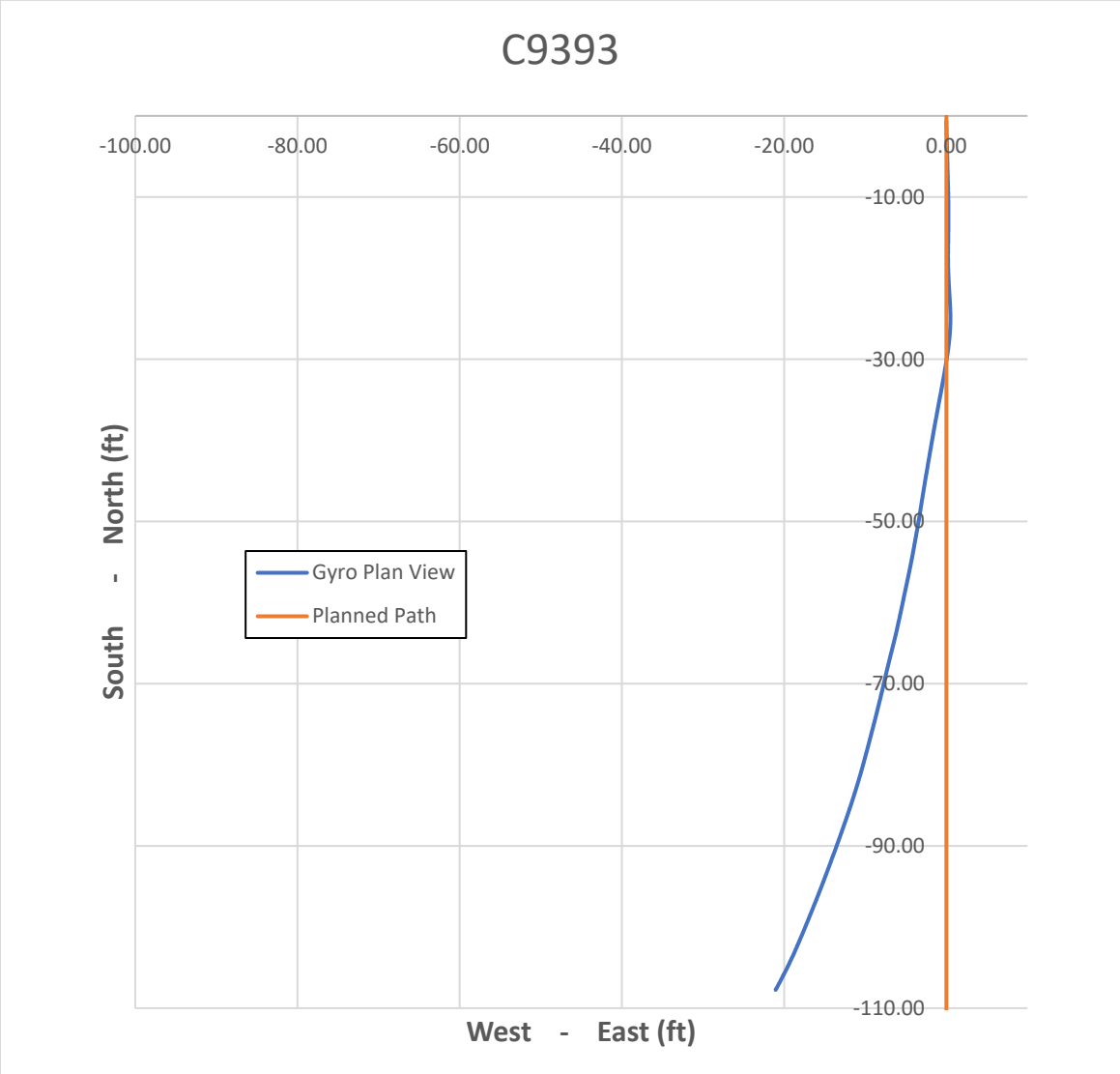


[a]KUT = potassium-40, uranium-238 and thorium-232



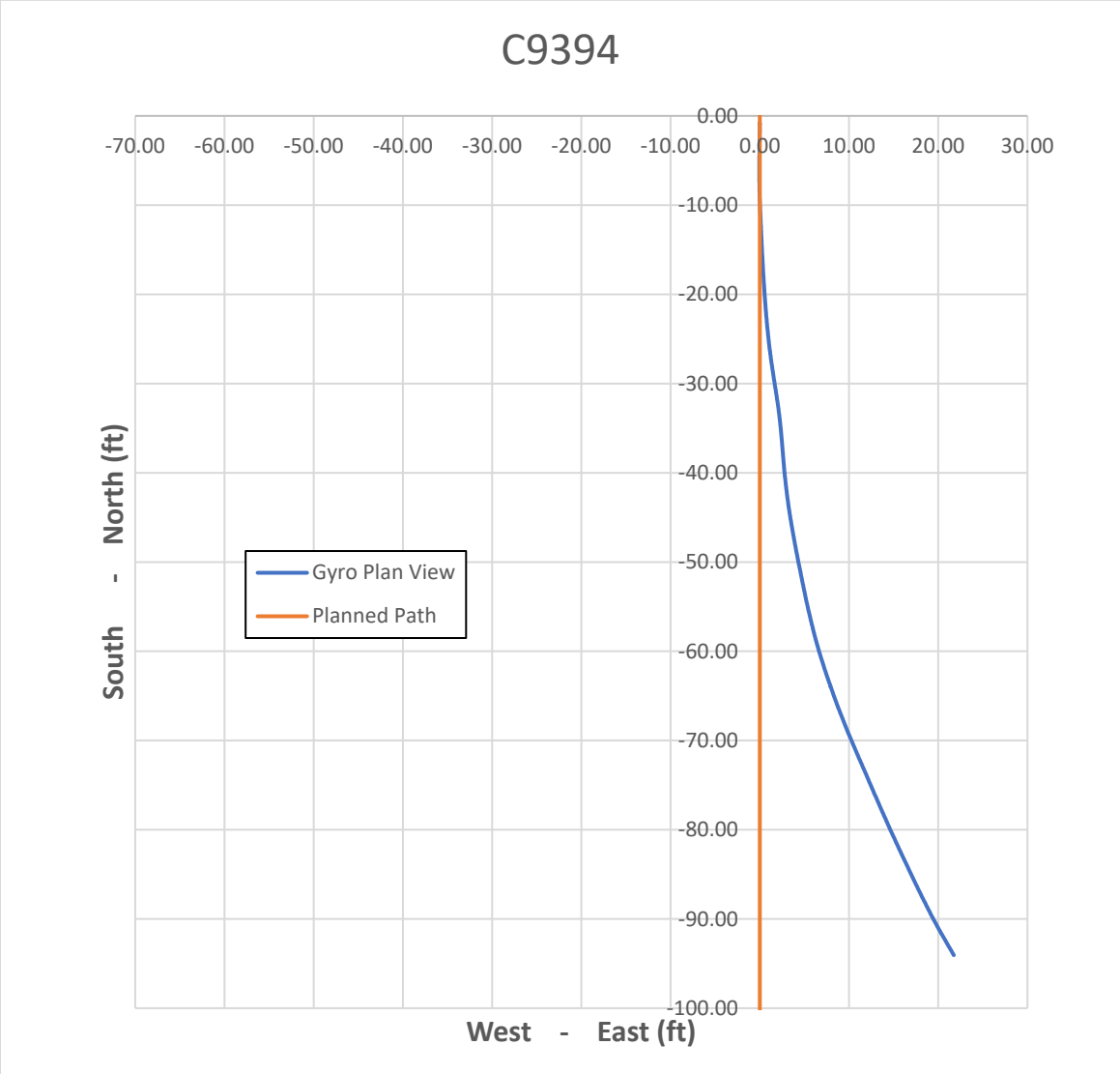
[a]KUT = potassium-40, uranium-238 and thorium-232

C9393 Gyroscope Deviation Plot



The surface starting azimuth was set to 180°, due south. As pushing progressed, the direction quickly turned slightly east, then significantly veered west.

C9394 Gyroscope Deviation Plot



The push path veered to the east from planned direction, shown in red.

A-Farm C9395 Header Information

Spectral Gamma – Moisture Survey

Log Date: Oct 17 - Nov 7, 2018 Depth Ref: Ground Surface

Observations

High Efficiency gamma detector BGO-3 tool was used to log this direct push. Two sets of KUT[a] plots are provided; one in feet (ft) pipe run and one in ft below ground surface (ft bgs). The BGO tool is only calibrated for Gross gamma and KUT. The gross gamma threshold is set at 50 keV and therefore responsive to the presence of Cs-137. The concentration of Cs-137 observed is estimated to be less than 15 pCi/g at maximum value as observed with the BGO-3 data. Cs-137 is visible in the BGO-3 data from 4 ft pipe run to surface and at 99 ft pipe run. The readings at 99 ft pipe run are at the same magnitude as at the surface.

The moisture measurement is derived from an instrument manufactured by Instro Tek Corporation. The instrument contains a neutron source and a thermal neutron detector. The gauge responds primarily to the surrounding hydrogen, hence water. Moisture values range from 4 to 18%. Not much moisture until 163 to 186 ft pipe run.

The temperature measurement is derived from the Omega Smart IR Temperature probe and run with the moisture tool. This probe measures the surface temperature of a solid or liquid without contact and can measure between -70 to 380°C (-94 to 716°F). Temperature values range from 14.8 °C (58.6 °F) to 50.1°C (122.2 °F) with the maximum temperature recorded is 50.1 °C (122.2 °F) at a depth of 92 ft pipe run.

Plan view plots of direct push gyroscope deviation results from the geophysical logging hole and sampling hole are also included (C9395 and C9396, respectively).

Conclusions

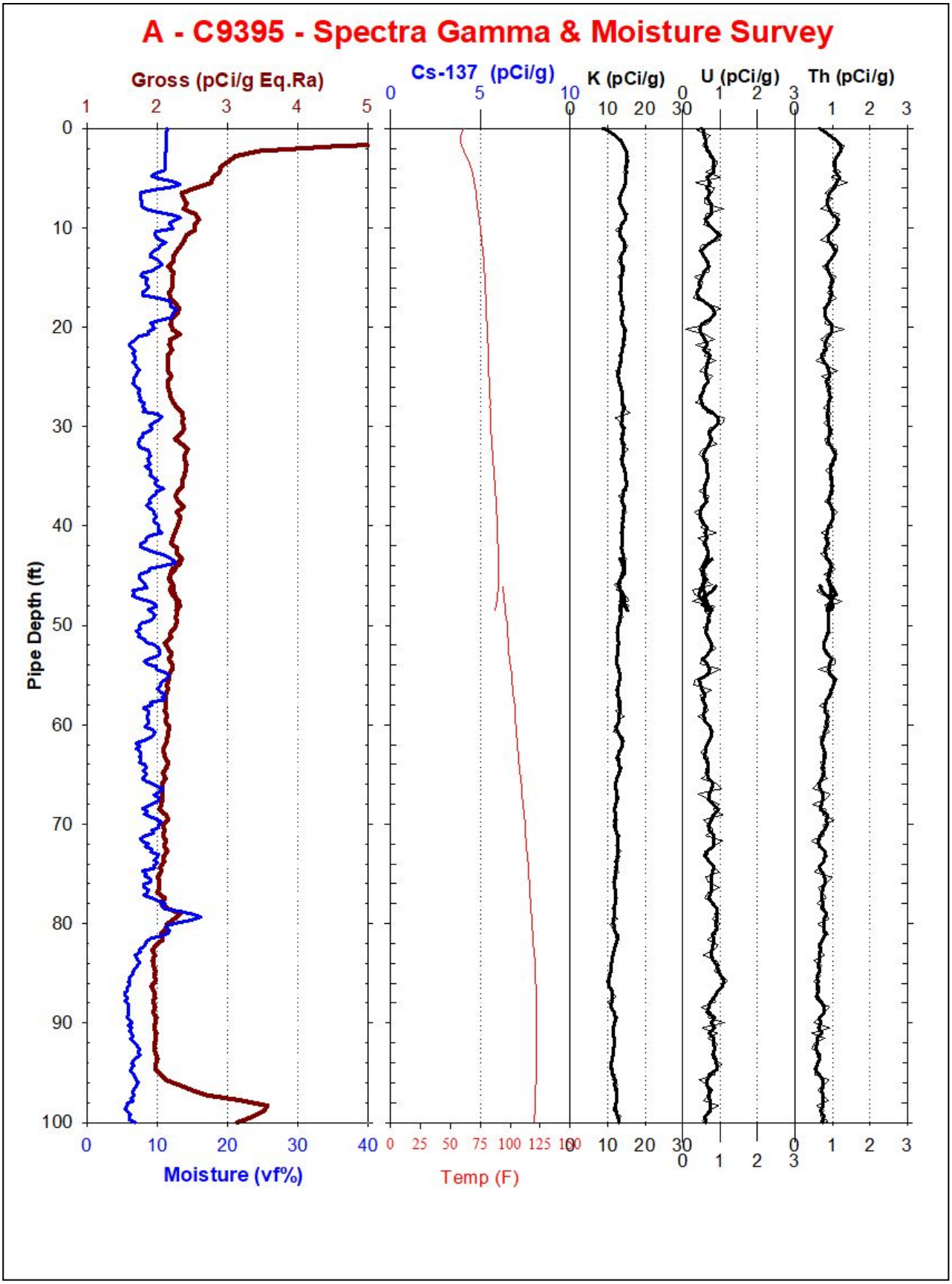
There is a possibility the push's large dip from vertical is washing out (muting) the moisture response. The temperature does not show normal geologic gradient. The temperature profile is indicative of a highly radioactive heat source remote from the direct push.

Calibration Certificates

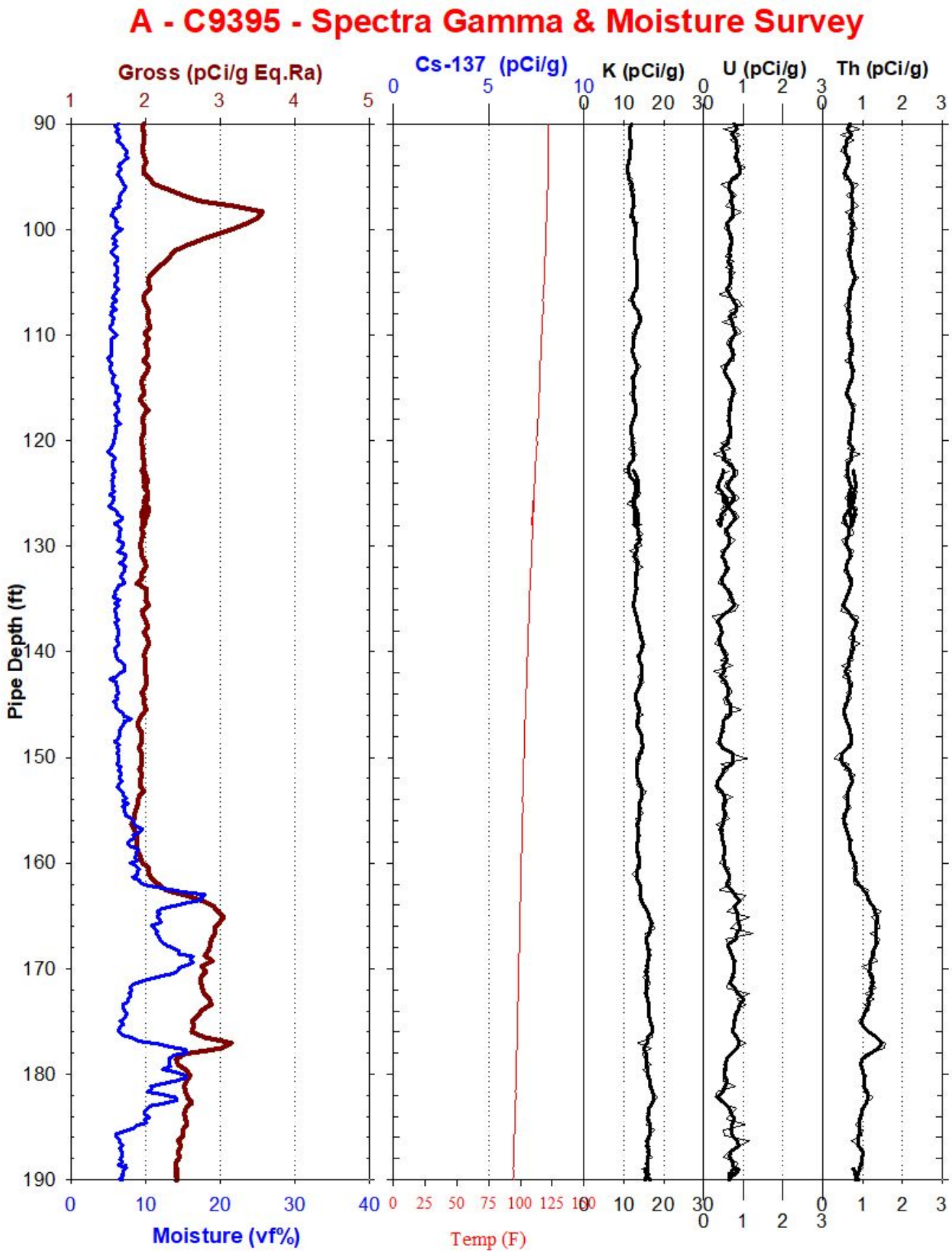
Moisture
Date: Oct 11, 2018
Electronic File: Moist-1_2018-v1.zip

Gamma BGO
Date: Oct 11, 2018 BGO-3
Electronic File: BGO-3_Oct2018-v1.zip

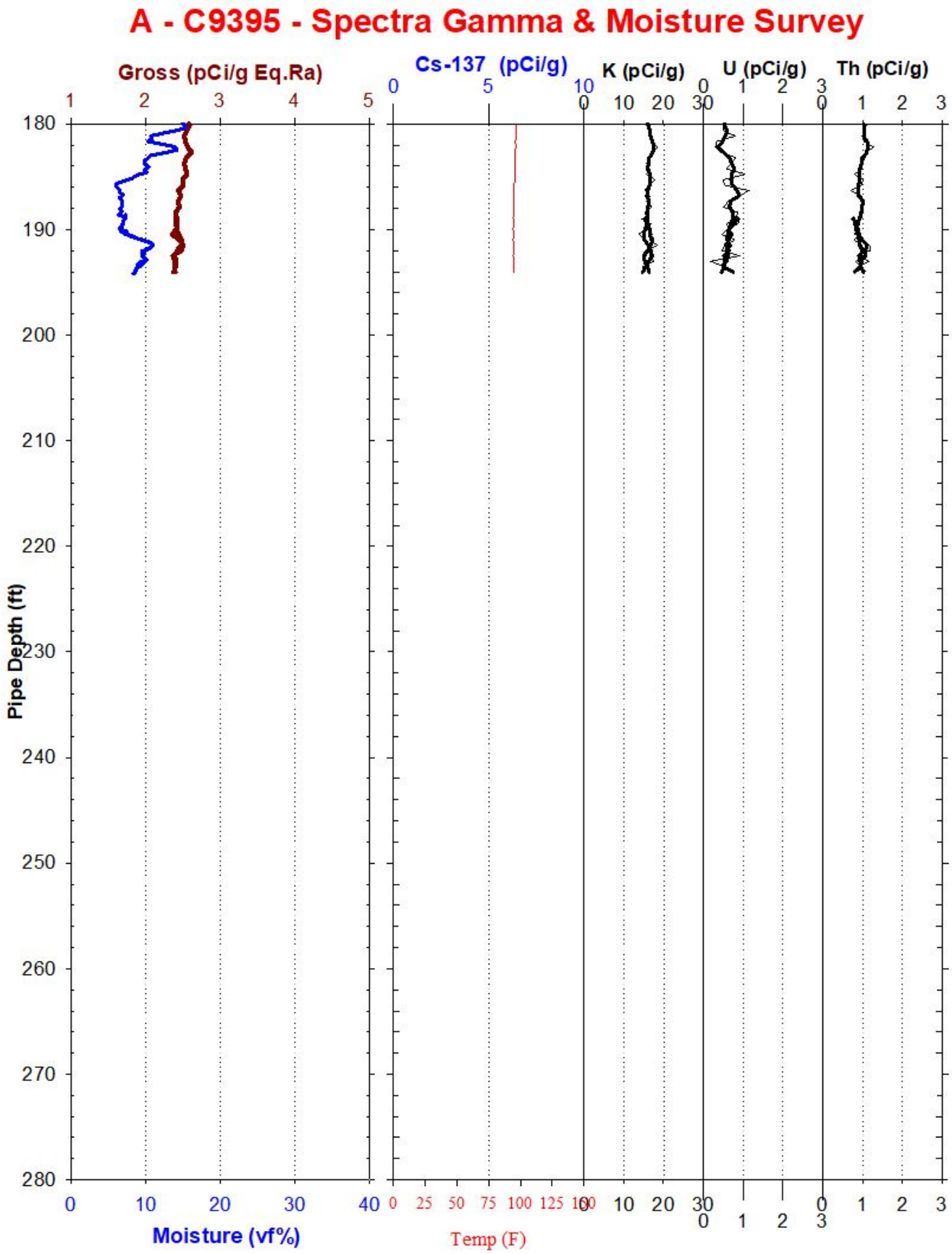
[a]KUT = potassium-40, uranium-238 and thorium-232



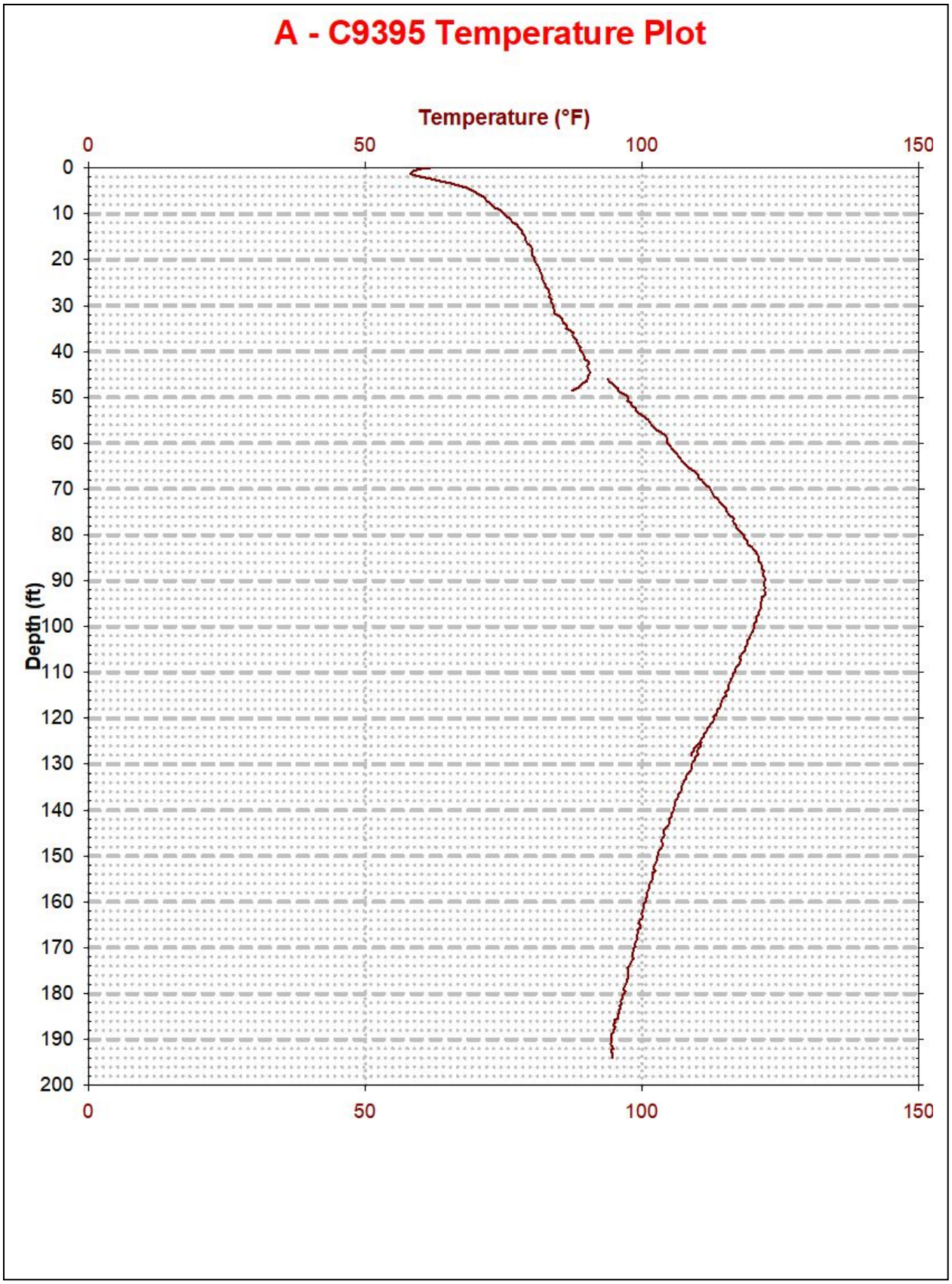
[a]KUT = potassium-40, uranium-238 and thorium-232

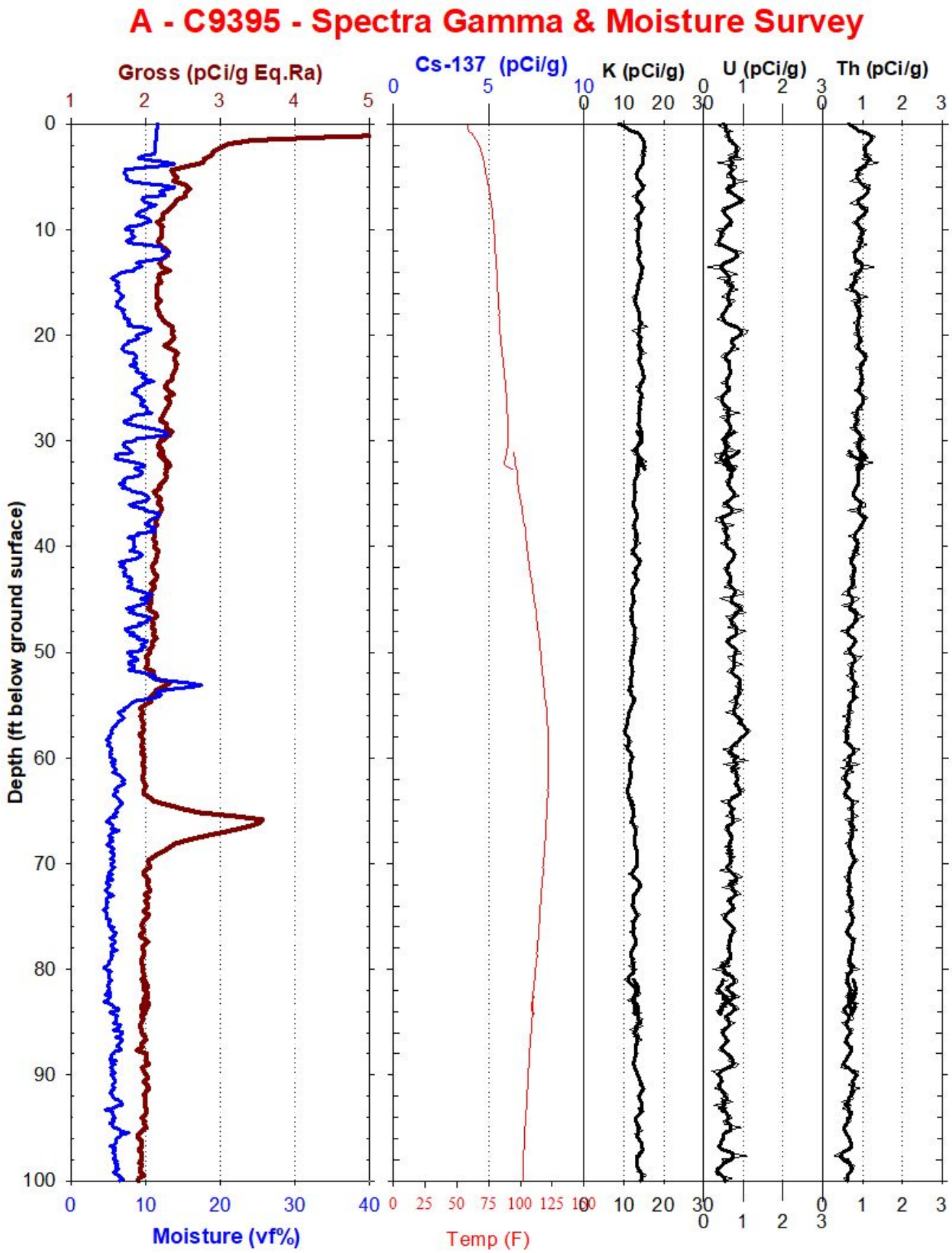


[a]KUT = potassium-40, uranium-238 and thorium-232

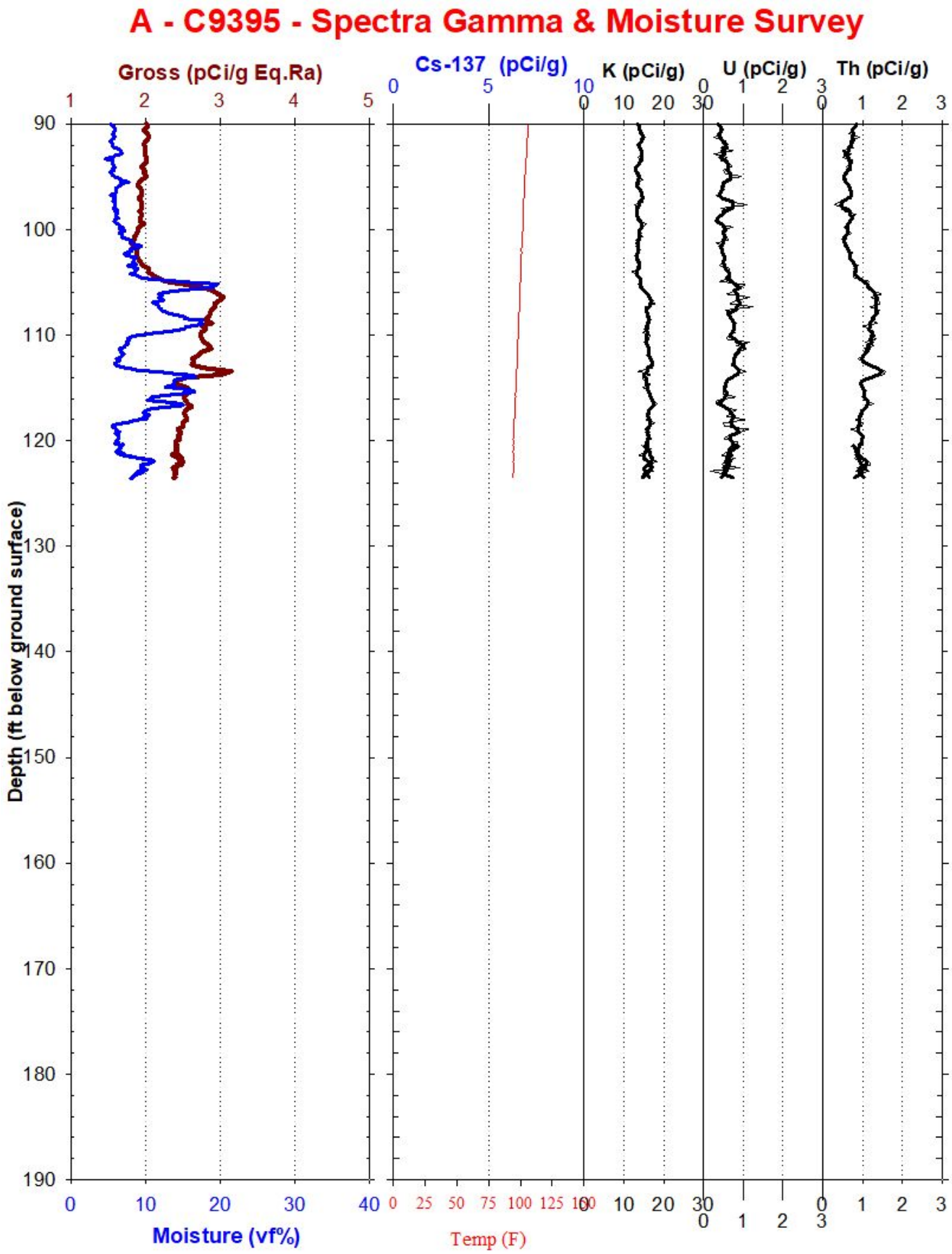


[a]KUT = potassium-40, uranium-238 and thorium-232


A - C9395 Temperature Plot
Temperature (°F)
0
50
100
150
Depth (ft)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

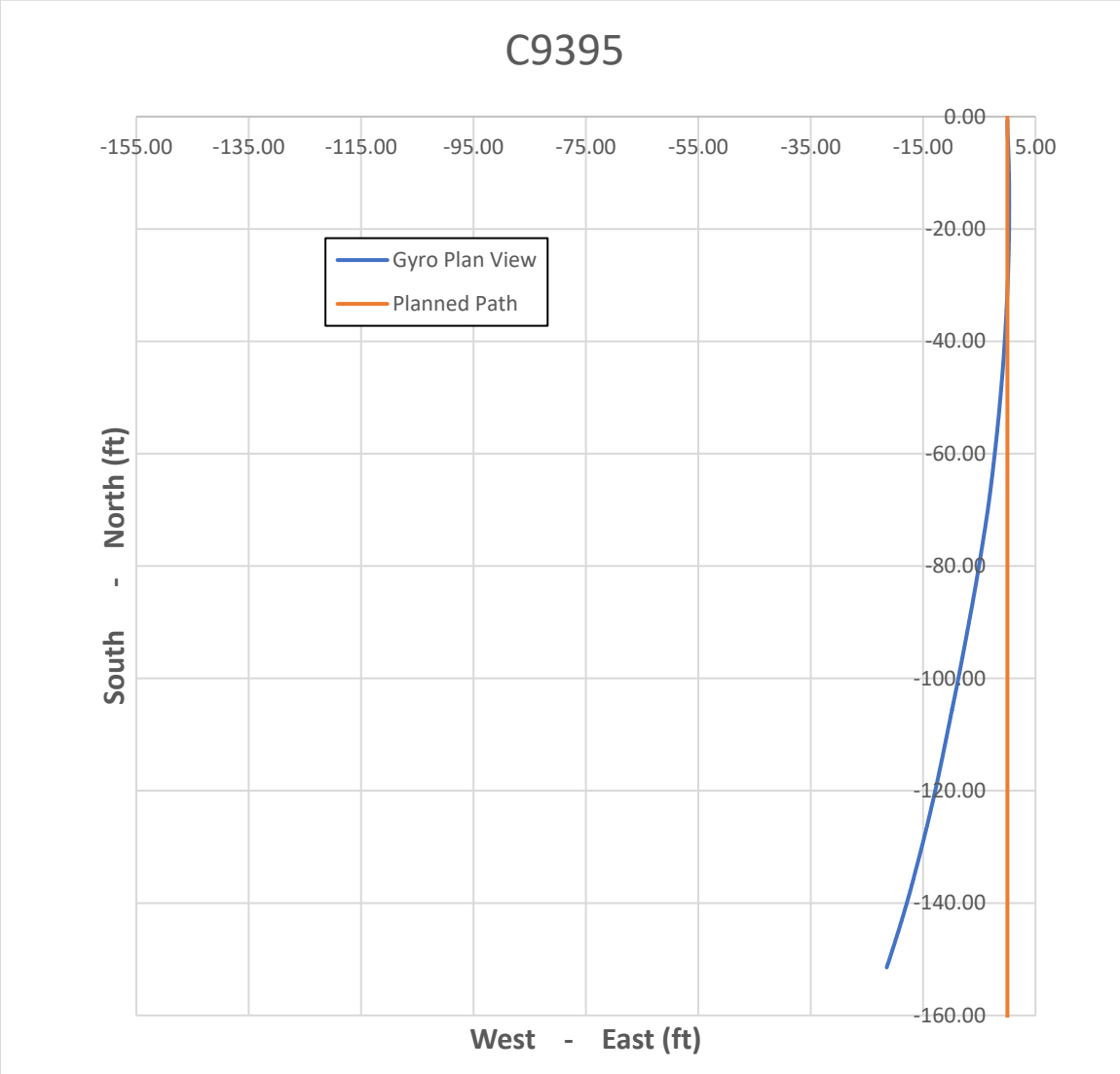


[a]KUT = potassium-40, uranium-238 and thorium-232



[a]KUT = potassium-40, uranium-238 and thorium-232

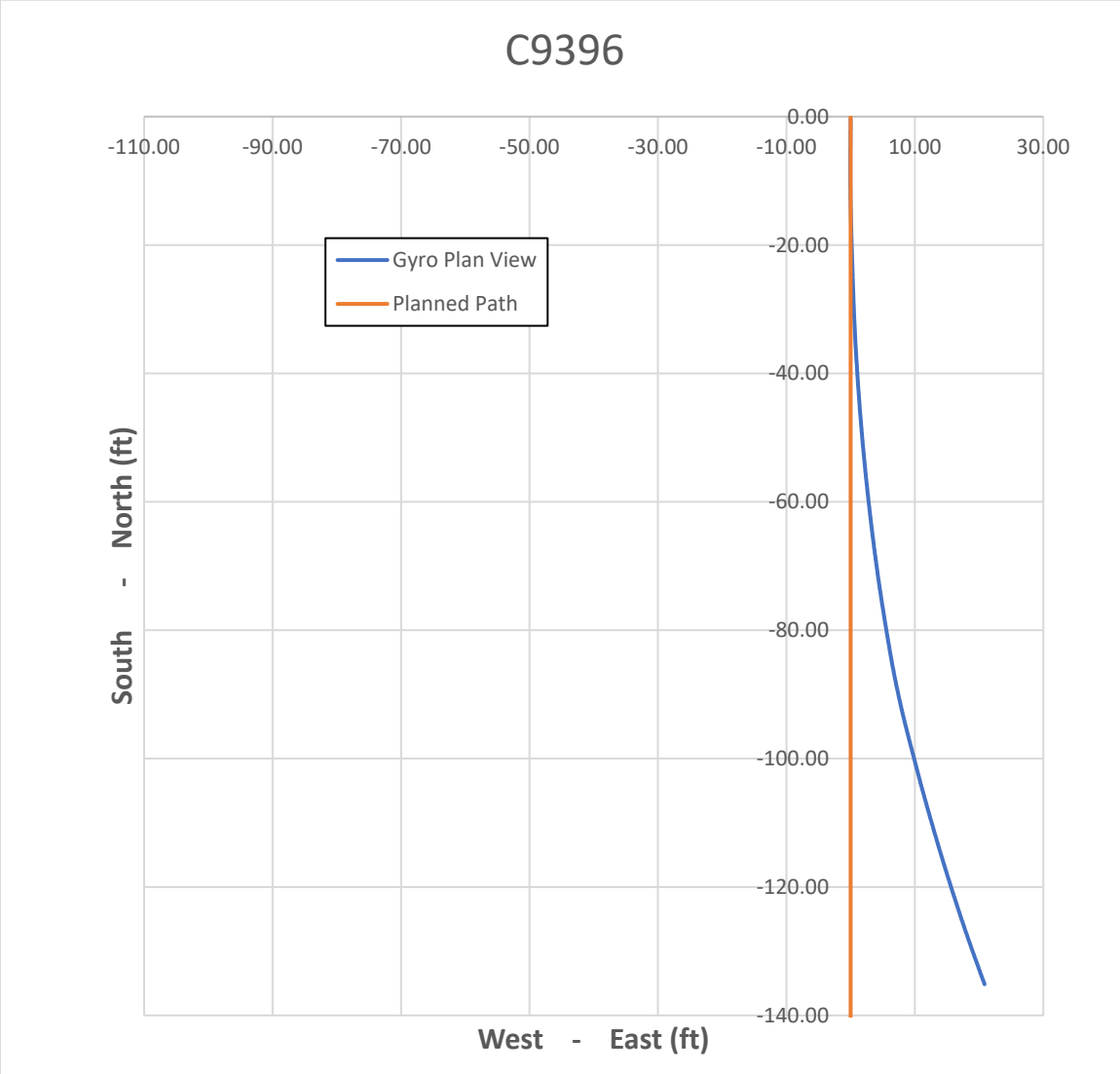
C9395 Gyroscope Deviation Plot



The push path veered to the west.

[a]KUT = potassium-40, uranium-238 and thorium-232

C9396 Gyroscope Deviation Plot



The push path veered to the east unlike the logging hole.

[a]KUT = potassium-40, uranium-238 and thorium-232

Attachment C: Calibration Certificates for Geophysical Logging and Gyroscope Instruments

Calibrations are required to be performed on new instruments prior to being placed into service and then annually or following instrument repairs. New logging instrumentation and support equipment were built for this project and initial calibrations were performed in June and July 2018. Due to the need to replace or repair instruments damaged during deployment and with the introduction of a second hoist unit, calibrations were performed at various times throughout the project life. This attachment provides the Calibration Certificates for the logging instruments, gyroscope and hoist depth encoders used to support the geophysical logging operations for the A-Tank Farm investigations from June 2018 thru September 2019.

Certificate of KUT Calibration
For Tool BGO-1

Jun 20, 2018

Data were taken at the Hanford KUT models on Jun 20, 2018. BGO-1 is the designated Scintillator tool. Four models were used for Spectral KUT calibration. 10 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.XLSX 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: 1332-1575 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 = 4.752 *Wk - 3.655*Wu + 2.131*Wt
Concentration-U = 1.428*Wu - 2.486*Wt
Concentration-T = -0.023*Wu + 1.755*Wt

Where Wk Wu & Wt 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_Jun2018-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_Jun2018-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 Jun 20, 2018.

Signature: _____ Date: Jul 15, 2018

Company: Three Rivers Scientific

Certificate of Depth Calibration

Unit Hoist-1

Jul 12, 2018

Calibration data were taken at well 699-W48-77A on Jul 12, 2018 for logging unit Hoist-1.

A standard tape was used to measure at selected depths into and out of the borehole, recording tape points and logging unit (computer generated) log depths. Standard encoder coefficient analysis results in a new value of depth coefficient.

The coefficient analysis is determined by the algorithm described in the operating procedures. The depth encoder function is defined by

$$D = E * a$$

Where D is the depth in feet, E are the encoder pulses delivered to the computer unit. The coefficient, a, is the fit coefficient in units of feet per pulses. The new result for a is:

a=0.0012926

The previous coefficient was changed approximately 0.9894. The average depth error over 95 to 105 ft deep is 1.16 inches.

The undersigned certifies that the data archived in file "dep_H-1_Jul2018.zip" were collected and evaluated in accordance with rigorous scientific principals and that the above stated calibration coefficient is correct and applicable for logging unit 1, Hoist-1 effective Jul 12, 2018.

Signature

Russel Randall, PhD Jul 15, 2018

Company: Three Rivers Scientific

Certificate of Calibration
BGO-1
Jun 20, 2018

Data were taken at the Hanford KUT models on Jun 20, 2018. BGO-1 is the designated Scintillator tool. The SBA model was used for the gross gamma calibration. Ten 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.xlsx 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:

$$a = .0240 \quad Eq.^{226}Ra\ pCi/g\ /\ (c/s)$$
$$b \equiv 0$$
$$\text{at energy threshold of 0keV}$$

$$a = .218 \quad Eq.^{226}Ra\ pCi/g\ /\ (c/s)$$
$$b \equiv 0$$
$$\text{at energy threshold of 800keV}$$

Digital files condensed as Cal-BGO-1_Jun2018-v0.zip. This compressed file contains:

- Calibration raw data
- Mathcad data processing
- Spreadsheet data formatting

The undersigned certifies that the data archived in the file "Cal-BGO-1_Jun2018-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 Jun 20, 2018.

Signature: Date: Jul 15, 2018

Russel Randall PhD

Moisture Calibration Extrapolation to 2.5 Inch Borehole

Instrument N-2 Moist792

Jun 20, 2018

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 = .0008265
α = 1.756

The undersigned certifies that the analysis files are archived in the file "Moist792_2018.zip" was evaluated in accordance with Energy Solutions procedures and that the above stated calibration coefficients are correct and applicable for tool Moist792, effective Jun 20, 2018.

Signature: Date:

Jul 16, 2018

Russel Randall, PhD
Three Rivers Scientific

Certificate of Calibration for
Instrument N-2 Moist792

Jun 20, 2018

Data were taken in the Moisture models on Jun 20, 2018 for Moist792 neutron-neutron moisture tool. The neutron source from DOE moisture tool ID of H370608792 was used with the passive neutron detector probe from TRS.

Six models were used for moisture calibration, three for 6"casing and three 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 = .0001101	a = .000003137
α = 2.279	α = 3.142

The undersigned certifies that the data archived in data file "Moist792_2018.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 Moist792, effective Jun 20, 2018.

Signature: Date:

Jul 16, 2018

Russel Randall, PhD
Three Rivers Scientific

Certificate of Calibration
CeBr-1
Cs-137 Photo Peak
Jul 18, 2018

Data were taken at the Hanford KUT models on Jul 18, 2018. CeBr-1 is the designated Scintillator tool. 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.xlsx for this analysis.

The instrument was covered with 0.37 inch wall-thickness probe-tubing. Data were collected with MC-3.

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:

$$C = A/(\varepsilon 661 * N)$$

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 ε661 is the fit coefficient for 661keV; generally ε is a function of gamma energy and ε661 is the specific efficiency at 661 keV. The CeBr scintillator has superior energy resolution. The coefficient was determined to be:

ε661 = 0.689 (c/s) / pCi/g

Digital files condensed as Cs-1_2018-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 "Cs-1_2018-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 CeBr-1 effective Jul 18, 2018.

Signature: Date: Jul 23, 2018

Russel Randall PhD

Moisture Calibration Extrapolation to 2.5 Inch Borehole
Instrument N-1 Moist792

Oct 11, 2018

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 = .0001641
α = 2.057

The undersigned certifies that the analysis files are archived in the file "Moist792_2018.zip" was evaluated in accordance with Energy Solutions procedures and that the above stated calibration coefficients are correct and applicable for tool Moist792, effective Oct 11, 2018.

Signature: Date:

Oct 11, 2018

Russel Randall, PhD
Three Rivers Scientific

Certificate of KUT Calibration
For Tool BGO-3

Oct 11, 2018

Data were taken at the Hanford KUT models on Oct 11, 2018. BGO-3 is the designated Scintillator tool. Four models were used for Spectral KUT calibration. 10 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.XLSX 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: 1332-1575 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 = 3.45 *Wk - 2.598*Wu + 1.252*Wt
Concentration-U = 1.028*Wu - 1.718*Wt
Concentration-T = -0.07*Wu + 1.942*Wt

Where Wk, Wu & Wt 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-3_Oct2018-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-3_Oct2018-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-3 effective Oct 11, 2018.

Signature: _____ Date: Oct 14, 2018

Company: Three Rivers Scientific

Certificate of Calibration
BGO-3
Oct 11, 2018

Data were taken at the Hanford KUT models on Oct 11, 2018. BGO-3 is the designated Scintillator tool. The SBA model was used for the gross gamma calibration. Ten 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.xlsx 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:

$$a = .0211 \quad Eq.^{226}Ra\ pCi/g\ /\ (c/s)$$
$$b \equiv 0$$
$$\text{at energy threshold of 0keV}$$

$$a = .188 \quad Eq.^{226}Ra\ pCi/g\ /\ (c/s)$$
$$b \equiv 0$$
$$\text{at energy threshold of 800keV}$$

Digital files condensed as Cal-BGO-3_Oct2018-v0.zip. This compressed file contains:

- Calibration raw data
- Mathcad data processing
- Spreadsheet data formatting

The undersigned certifies that the data archived in the file "Cal-BGO-3_Oct2018-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-3 effective Oct 11, 2018.

Signature: _____ Date: Oct 14, 2018

Russel Randall PhD

Certificate of Calibration for
Instrument N-1 Moist792

Oct 11, 2018

Data were taken in the Moisture models on Oct 11, 2018 for Moist792 neutron-neutron moisture tool. The neutron source from DOE moisture tool ID of H370608792 was used with the passive neutron detector probe from TRS.

Six models were used for moisture calibration, three for 6"casing and three 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 = .000118	**a = .00006102**
α = 2.273	**α = 2.543**

The undersigned certifies that the data archived in data file "Moist792_2018.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 Moist792, effective Oct 11, 2018.

Signature: Date:

Oct 14, 2018

Russel Randall, PhD
Three Rivers Scientific, LLC

Certificate of Depth Calibration

Unit Hoist-2

Dec 19, 2018

Calibration data were taken at well 699-W48-77A on Dec 19, 2018 for logging unit Hoist-2.

A standard tape was used to measure at selected depths into and out of the borehole, recording tape points and logging unit (computer generated) log depths. Standard encoder coefficient analysis results in a new value of depth coefficient.

The coefficient analysis is determined by the algorithm described in the operating procedures. The depth encoder function is defined by

$$D = E * a$$

Where D is the depth in feet, E are the encoder pulses delivered to the computer unit. The coefficient, a, is the fit coefficient in units of feet per pulses. The new result for a is:

a=0.001286

The previous coefficient was changed approximately 0.9947. The average depth error over 100 ft logged is 0.49 inches.

The undersigned certifies that the data archived in file "dep_H-2_dec2018.zip" were collected and evaluated in accordance with rigorous scientific principals and that the above stated calibration coefficient is correct and applicable for logging unit 2, Hoist-2 effective Dec 19, 2018.

Signature

Russel Randall, PhD Jan 3, 2019

Company: Three Rivers Scientific, LLC

Certificate of Calibration
CeBr-1
Cs-137 Photo Peak

Jan 21, 2019

Data were taken at the Hanford KUT models on Jan 21, 2019. CeBr-1 is the designated Scintillator tool. fifty spectra were recorded for 10 seconds each spectra in the SBU model. The observed deviations were seen to be near the theoretically predicted variation, refer to the files compressed: Stats.xlsx for this analysis.

The instrument was covered with 0.37 inch wall-thickness probe-tubing. Data were collected with MC-3.

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:

$$C = A/(\varepsilon 661 * N)$$

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 ε661 is the fit coefficient for 661keV; generally ε is a function of gamma energy and ε661 is the specific efficiency at 661 keV. The CeBr scintillator has superior energy resolution. The coefficient was determined to be:

$$\varepsilon 661 = 0.608 \quad (c/s) \ / \ pCi/g$$

Digital files condensed as Cs-1_2019-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 "Cs-1_2019-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 CeBr-1 effective Jan 21, 2019.

Signature: _____ Date: Jan 29, 2019

Russel Randall PhD

Certificate of Depth Calibration

Unit Hoist-2

Jun 6, 2019

Calibration data were taken at well 699-W48-77A on Jun 6, 2019 for logging unit Hoist-1.

A standard tape was used to measure at selected depths into and out of the borehole, recording tape points and logging unit (computer generated) log depths. Standard encoder coefficient analysis results in a new value of depth coefficient.

The coefficient analysis is determined by the algorithm described in the operating procedures. The depth encoder function is defined by

$$D = E * a$$

Where D is the depth in feet, E are the encoder pulses delivered to the computer unit. The coefficient, a, is the fit coefficient in units of feet per pulses. The new result for a is:

a=0.001296

The previous coefficient was changed approximately 1.0088. The average depth error over 100 ft logged is 0.34 inches.

The undersigned certifies that the data archived in file "dep_H-1_Jun2019.zip" were collected and evaluated in accordance with rigorous scientific principals and that the above stated calibration coefficient is correct and applicable for logging unit 1, Hoist-1 effective Jun 6, 2019.

Signature

Russel Randall, PhD Jun 10, 2019

Company: Three Rivers Scientific, LLC

Test and Calibration Certificate for REFLEX EZ-GYRO™

Your **REFLEX** EZ-GYRO™ system has been manufactured using pre-tested components. Following assembly approval, the **REFLEX** EZ-GYRO™ probe has been subjected to the **REFLEX** standard testing procedures. Following satisfactory completion of the assembly tests, the **REFLEX** EZ-GYRO™ probe has been calibrated in accordance with **REFLEX** standards.

Actual calibration results are shown in this certificate for your information and reference. In addition, your **REFLEX** EZ-GYRO™ system is covered by the Worldwide Warranty of Material and Workmanship issued by **REFLEX** Technology International.

All **REFLEX** product deliveries are made in accordance with the General Conditions for the Supply of Plant and Machinery for Export, prepared under the auspices of the United Nations Economic Commission for Europe, Geneva, December 1953.

Calibration Test Data

Calibration completed on	28-Jun-2019
Recalibration Due	27-Jun-2020
Tool serial number	EG0281
Temperature range (°C)	+4.91 to +72.37

Tool Error

	1σ Error Azimuth (Dip -80° to -60°)	Max Dip (Dip -90° to -60°)	1σ Error VTF (Dip -90° to -60°)	Max GTF (Dip -80° to -60°)
IMU	0.57	0.07	0.56	0.37
Limits	0.7	0.25	0.7	1

TOOL STATUS: PASSED

CALIBRATED BY	IMD:
AH	28-JUN-19

REFLEX Technology International Pty Ltd

216 Balcatta Road, Balcatta
Western Australia 6021

PO Box 1148, Osborne Park
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REFLEX™ INTELLIGENCE ON DEMAND

APPENDIX G

SAMPLE INTERVAL SELECTION MEETING MINUTES

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WMA A-AX Focus Area 1 Sample Depth Meeting #1

~~DRAFT~~ km schuyler 12/5/18

MEETING NOTES

WMA A-AX Focus Area 1 Sample Interval Selection Meeting - C9386 and C9394

Meeting Date: November 7, 2018

Location: 3100 Port of Benton Blvd, Room 28

ATTENDEES:

Cindy Tabor (WRPS)
Ryan Childress (WRPS)
Jan Bovier (DOE-ORP)
Mike Barnes(Ecology)
Marysia Skorska (Ecology)
Kim Schuyler (Freestone)

BACKGROUND:
This meeting was part of the continuing effort to ensure communication between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions (WRPS) representatives regarding characterization activities in Waste Management Area A-AX. Specifically RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* states that "geophysical logging data along with any available quick turnaround analysis results ("quick turn") for two mobile contaminants (technetium-99 and nitrate) will be used to aid in determining subsurface sample depths. The subsurface sampling horizons will be selected in an open meeting to which WRPS staff, DOE, Ecology, U.S. Environmental Protection Agency (EPA), and other site contractors shall be invited."

Purpose of Meeting: This meeting was called to provide field status information, review geophysical logging data results from direct push locations C9385 and C9393, discuss the sample depth selection process, and agree upon sample depth intervals for C9386 and C9394.

Discussion: Ecology was provided information on two direct push locations in A Farm (exploratory boreholes C9385 and C9393). Both exploratory boreholes had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, and thorium data, and historical information were used to select sample depths. Ecology was also briefed on the status of field work for WMA A-AX Focus Area 1 (see Attachment 1).

<u>Field Work Status:</u>
Cindy Tabor identified that field statuses had been previously provided to Ecology and that several issues had occurred. It was identified that these issues more than likely due to the program being shutdown in 2015 and being restarted again or because these pushes were deeper than ever pushed before.

Pipe (casing) breaks occurred at two direct push locations, first at vertical location C9385 and then at angled location C9391, 72 feet below ground surface (ft bgs) and 180 (ft pipe run), respectively. Additionally, the gamma logging tool with the cerium bromide crystal was damaged while logging at C9385. Mike Barnes of Ecology, the Project Manager for this effort was notified of these issues in

September. In an email dated September 20, 2018, Mike Barnes provided concurrence that C9385 did not need to be re-pushed because moisture and temperature profiles of C9385 and C9383, a vertical location approximately 2 feet away, were consistent. It was also identified in September that it would be problematic to install resistivity electrodes in C9385. Ecology verbally identified that they were not necessary due to the close proximity to C9383, which has resistivity electrodes.
Mike Barnes also indicated that C9391 should be re-pushed because:

- It would not be possible to determine where moisture zones are present or if thin beds are located deep in the subsurface.
- The surface geophysical exploration (SGE) data shows a highly conductive area and the drywells 10-05-09, 10-04-04, and 10-04-05 all show high temperature anomalies.
- It is very important to have the logging information to assist with selecting the deep sampling intervals.

Mike Barnes recommended borehole C9391 be re-pushed and logged, so the information is available for future sample depth selection. DOE agreed to re-pushing C9391. Ecology was also informed that new tubing (casing) for pushing is needed going forward with this project. It is believed new tubing may prevent breaks at other locations.

Cindy Tabor then explained that the surface, surface duplicate, 7 - 9 ft, and 12 - 14 ft samples have been collected at C9386.

Sample Selection:
It was noted that the sample depth selection process is slightly different than described in the A-AX DQO (RPP-RPT-60227, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area A-AX* [DQO]). A set of sample depths identified using a random selection process were available to be selected in lieu of strictly judgmental sample depths. A hard copy plot of C9383 and C9385 total gamma and moisture geophysical logging data was presented. The plots show sample depths, judgmental and random depths, overlain on the geophysical data plot for each respective boring. The meeting attendees were given the opportunity to decide if random sample depths, judgmental sample depths, or a combination of both should be selected. Ecology decided against using the randomly-generated sample depths.

C9386
Sample depth discussion at C9386 began with the selection of two sample intervals (273 – 275 ft bgs and 275 – 277 ft bgs) in the geologic unit identified as CCu (Cold Creek unit). Mike Barnes identified that the excess moisture in the CCu may have another source and an additional sample in the lower portion of the CCu may be beneficial.

The transition zone at 53 – 55 ft was not included in the original list of sample depths, but Mike Barnes stated the contact between backfill and H1 may show the backfill to contain contaminants more closely associated with 200-E-286 Ditch, which was located in the southwestern corner of A Farm. Mike Barnes stated that the backfill used in A Farm may contain soils that were removed from the 200-E-286 Ditch. A sample of the backfill could be good background information for work to be completed in the future. Mike Barnes identified that he thinks only Ion Chromatography (IC) analysis should be performed at this interval. Cindy Tabor indicated that the DQO identified other data was needed for various purposes such

as risk assessment. Altering the list of analyses would not be consistent with the DQO. Cindy Tabor took the action of looking into the feasibility of changing the list of required analyses, if the need arose.

Interest is high for a sample near the bottom of the backfill, and high fluoride concentrations could be responsible for corrosion at approximately 60-70 bgs in drywell 10-05-10.

The other sample depths were agreed upon and consistent with the reasoning in Table 1. The list of sample depths were re-read to the meeting attendees and all parties concurred with the list of sample depths identified in Table 1.

Table 1. Sample Depths Selected for C9385/C9386

Sample depth (ft bgs)	Reason	Stratigraphy
53-55	High moisture peak (just below backfill/H1 contact)	H1
75-77	High moisture and gamma peak (near transition H1/H2)	H2
132-134	High moisture and gamma peak	
210-212	Unusual signature – increased moisture and decrease gamma	
263-265	High moisture	
273-275	Highest moisture and higher gamma peak (just below H3/CCu transition)	CCu
275-277[a]	Additional sample in the CCu to investigate high moisture	

[a]Identified as a random depth in Attachment 1.

C9394

Sample depths were discussed for C9394. Several features were of interest to Ecology, especially subsurface temperature. Mike Barnes stated high tank heat is responsible for heat deep in the subsurface (e.g., greater than 60 ft). Heat could have been caused by hot liquid passing through the vadose zone or heat from the tank itself by conduction/propagation through the soil. Mike Barnes said it would be good to review of Mart Oostrom study about temperature propagation and prediction using dry well temperature. Cindy Tabor took the action to find out the status of this report's productions.

The first sample depth selected was in the CCu at 288-290 ft pipe run (as opposed to below ground surface). A second CCu sample was selected (293-295 ft pipe run). Ecology identified it would be beneficial to review the "quick-turn" CCU data from C9386 samples to determine if this additional CCu sample should be collected. Ecology inquired about the timeline for "quick-turn" results from C9386 and was told December. Based on the sample results in the CCu at C9386, the second sample depth in the CCu at C9394 may be moved to a different depth. Additional discussion will occur once the sample results from the CCu "quick-turn" depth are available.

The other sample depths were agreed upon and consistent with the reasoning in Table 2. The list of sample depths were re-read to the meeting attendees and all parties concurred with the list of sample depths identified in Table 2.

~~DRAFT~~ Kim 12/5/18

Table 2. Sample Depths Selected for C9393/C9394

Sample depth (ft bgs) Pipe run Cynthia Tabor 11/28/18	Reason	Stratigraphy
107-109	High moisture and gamma peak (near transition H1/H2)	H2
146-148	High moisture	
164-166	Under lateral/high temperature	
177-179	High moisture and gamma peak	
196-198	Unusual signature – increased moisture and decrease gamma	
288-290	Highest moisture and gamma peak (just below H2/CCu transition)	CCu
293-295[a]	Additional sample in the CCu to investigate high moisture	

[a]Identified as a random depth in Attachment 1

The following is the information provided to Ecology during the meeting:

- Handout "Attachment 1"
- One table identifying summary information about the five direct push locations in WMA A/AX Focus Area 1 (refer to Table 1 included in Attachment 1)
- Summary of rationale and general notes to support sample depth selection for C9386 and C9393 (see Tables 2 and 3 in Attachment 1).
- Copy of Figure 5-1 ("Direct Push Locations for WMA A-AX Focus Area 1") from RPP-PLAN-62041.
- Spectra Gamma & Moisture Surveys (geophysical logs) in "pipe run" depth for C9393 and vertical depth for C9385. The logs show the proposed sample depths along with lithologic/stratigraphic unit information.
- Two cross sections showing the relative location of the C9385/C9386 and C9393/C9394 borehole paths and sample depths with respect to the 241-A-104 or 241-A-105 tanks.
- Hard copies of field geophysical logging results (gamma, moisture, temperature) from C9393 and C9385.

Action Items:

- Cindy Tabor will look into the feasibility of changing the list of required analyses on a per-sample basis, should the need arise.
- Cindy Tabor to find out the status of Mart Oostrom study about temperature propagation and predictions of vadose zone heat surrounding single-shell tanks.

JAN B BINER	Jan B Biner	11/28/2018
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Mike Barnes	Mike W Barnes	12-4-18
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

WMA A-AX Focus Area Sample Depth Meeting – C9386 and C9394
November 7, 2018

Field Status:

Table 1: Logging Holes, Logging, and Decommissioning

Location (vertical or angle)	Proposed Depth[a]	Actual Depth[a]	Logged	Decommissioned/ Electrodes Installed
C9385 (vertical)	285	TD = 285.5	Completed	Completed/No[b]
C9387 (35° angle)	295	Not started	Not started	Not started
C9391 (30° angle)	279	Being repushed[c]	Not started	Not started
C9393 (15° angle)	295	PR = 295	Completed	Not started
C9395 (45° angle)	197	PR = 197	In process	Not started

TD = total depth, PR = pipe run

[a]For vertical hole, information is in feet below ground surface (ft bgs). For angle holes, information is in ft pipe run.

[b]A pipe break occurred at ~72 ft bgs and a decision was made and agreed to by Ecology that electrodes would not be installed at this location. There are electrodes installed at a location ~2 ft away at C9383.

[c]Pipe break approximately 180 ft pipe run (~156 ft bgs). Ecology asked to repush since logging would have only been completed to 180 ft pipe run.

Sampling Hole

C9386: Surface and Surface Duplicate, 7-9 ft bgs, and 12-14 ft bgs sample collected.

Data Evaluated to Help Determine Possible Sample Depths:

- Gamma, moisture, and temperature data for C9385 (vertical push) and C9393(15° angle push) Note: Plots are available in Vertical Depth and Pipe Run Depth for C9393 since this is angle push.
- Vertical profile and cross section view of sample depths for C9393 (for depth perspective and relationship to tank)
- Relevant available information from 2014/2015 A-AX Direct Push efforts: Location C9383 (vertical push)
- Relevant available dry well logging information (10-04-01, 10-05-10, and 10-05-12)

General Notes:

- The basis for standard sampling is described in RPP-RPT-60227, DQO Report WMA A-AX, Rev. 0 (Focus Area 1), which indicates that these samples are to be collected from:
  - Recommending 10 sample depths: 3 sample depths of - surface, 7-9, and 12-14 ft bgs (vertical depths) and 7 deeper samples (intervals recommended are identified in Tables 2 and 3).
  - Specific information on shallower intervals for the 15° angle of C9393:
    - 7 to 9 ft bgs is equivalent to 7.25 to 9.32 ft of pipe run – therefore collecting samples at 7 to 9 ft pipe run
    - 12 to 14 ft bgs is equivalent to 12.4 to 14.5 ft of pipe run – therefore collecting samples at 12 to 14 ft pipe run

WMA A-AX Focus Area Sample Depth Meeting – C9386 and C9394
November 7, 2018

Table 2: Sample Depth Recommendations for C9385/C9386

Judgmental		Stratigraphy	Random
Recommended Sample Depth (ft bgs)	Reason		Recommended Sample Depth (ft bgs)
NA	-	H1	60-62
75-77[a]	High moisture and gamma peak (near transition H1/H2)	H2	NA
86-88	High moisture and gamma peak		NA
132-134[a]	High moisture and gamma peak		82-84
177-179	High moisture		94-96
210-212	Unusual signature – increased moisture and decreased gamma		120-122
263-265	High moisture		220-222
NA	-	H3	270-272
273-275	Highest moisture[b] and higher gamma peak (just below H3/CCu transition)	CCu	275-277

Note: The following are the stratigraphic units identified from logging hole C9385 (in ft bgs): Backfill = 0-52, H1 = 52-74, H2 = 74-268 (upper 74-133 and lower 133-268), H3 = 268-273, and CCu 273-285.5 (CCugravel 281-285.5).
NA = not applicable
[a]Sample depth was also selected from logging location C9383.
[b]Moisture reading approximately 38%.

Table 3: Sample Depth Recommendations for C9393/C9394

Judgmental		Stratigraphy	Random
Recommended Sample Depth (ft pipe run)	Reason		Recommended Sample Depth (ft pipe run)
NA	-	H1	54-56
NA	-		76-78
107-109	High moisture and gamma peak (near transition H1/H2)	H2	NA
146-148	High moisture		NA
164-166	Under lateral/high temperature		218-220
177-179	High moisture and gamma peak		220-222
196-198	Unusual signature – increased moisture and decreased gamma		240-242
236-238	High moisture and gamma peak		248-250
288-290	Highest moisture[a] and gamma peak (just below H2/CCu transition)	CCu	293-295

Note: The following are the stratigraphic units identified from logging hole C9393 (in ft pipe run): Backfill = 0-28, H1 = 28-106, H2 = 106-288 (upper 106-144 and lower 144-288), and CCu 288-295.1.
NA = not applicable
[a]Highest moisture area.

MEETING NOTES

WMA A-AX Focus Area 1 Sample Interval Selection Meeting –C9396

Meeting Date: March 19, 2019

Location: 2440 Stevens Center Boulevard, Room 1600, Richland, WA

ATTENDEES:

Cindy Tabor (WRPS)
Dave Becker (WRPS)
Jan Bovier (DOE-ORP)
Rod Lobos (DOE-ORP)
Mike Barnes(Ecology)
Marysia Skorska (Ecology)
Kim Schuyler (Freestone)

BACKGROUND:
This meeting was part of the continuing effort to ensure communication between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions (WRPS) representatives regarding characterization activities in Waste Management Area A-AX. Specifically RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* states that "geophysical logging data along with any available quick turnaround analysis results ("quick turn") for two mobile contaminants (technetium-99 and nitrate) will be used to aid in determining subsurface sample depths. The subsurface sampling horizons will be selected in an open meeting to which WRPS staff, DOE, Ecology, U.S. Environmental Protection Agency (EPA), and other site contractors shall be invited."

Purpose of Meeting: This meeting was called to provide a brief update on field status, review geophysical logging data results from direct push locations C9395, discuss the sample depth selection process, and agree upon sample depth intervals for C9396.

Discussion: Ecology was provided information on one direct push locations in A Farm (exploratory direct push location C9395). This location had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, and thorium data, and historical information were used to select sample depths. Ecology was also briefed on the status of field work for WMA A-AX Focus Area 1. A map of WMA A-AX was presented and Cindy Tabor identified C9395/C9396 as the location in which sample depths are to be selected. The 241-A-105 Tank is the target of characterization.

Field Work Status:
Ms. Tabor provided a brief summary of field activities. Ms. Tabor identified that a more detailed field status had been previously provided to meeting attendees during the "Waste Management Area A-AX: Briefing on Focus Area 2 and Field Updates on Focus Area 1" meeting held on March 5, 2019.

- All work at location C9385/C9386 is complete.
- Location C9391 is being geophysically logged.
- Location C9393 been logged and Location C9394 was being sampled.
- Location C9395 has been logged.
- Work has not started at C9387/C9388.

Mike Barnes requested draft geophysical logging from C9391 but Ms. Tabor stated that the location was still being logged. She also noted that inclement winter weather had impacted logging schedule.

Sample Selection:
It was noted that the sample depth selection process is slightly different than described in the A-AX DQO (RPP-RPT-60227, Rev. 0, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area A-AX* [DQO]). A set of sample depths identified using a random selection process were available to be selected in lieu of strictly judgmental sample depths. A hard copy plot of C9395 gross gamma and moisture geophysical logging data was presented. The plots show sample depths, judgmental and random depths, overlain on the geophysical data plot. The meeting attendees were given the opportunity to decide if random sample depths, judgmental sample depths, or a combination of both should be selected. Ecology decided against using the randomly-generated sample depths.

C9396
Ms. Tabor noted that sample depths are measured in ft length of piperun as opposed to ft below ground surface. The piperun measurement is the reference point used by the field sampling crew identify sample depth intervals in the field. Figure 1-3 from RPP-PLAN-62041 was displayed on the screen to facilitate the discussion of sample depths with respect to sample depth intervals. Ms. Tabor noted that this is the most shallow push location, extending to 139 ft below ground surface (bgs) (197 ft piperun). This location did not encounter the Hanford formation unit 3 or the Cold Creek Unit.

Per RPP-PLAN-62041, three shallow depths will be collected: surface, 10 to 12 ft of piperun (equivalent to 7 to 9 ft bgs), and 17 to 19 ft of piperun (equivalent to 12 to 14 ft bgs).

Ms. Tabor noted the first sample interval is below a pipeline show on the location map. Marysia Skorska inquired about the use of the pipeline (200-E-143-PL). Ms. Schuyler stated that it supplied waste to the WMA A-AX tanks and this sample depth was not selected due to a suspected leak. The first sample depth selected was **97-99 ft piperun** due to its unusual gamma signature. Ms. Tabor briefly discussed all of the sample depths identified Table 1 of Attachment A. Mr. Barnes inquired about the straightness of the push; Ms. Schuyler stated there was approximately 4 ft of offset at deeper depths. Mr. Barnes indicated that was an acceptable deviation.

Mr. Barnes indicated that the area beneath the southeastern edge of the corner (identified as Area "C" in Figure Figure 1-3 from RPP-PLAN-62041) should absolutely be sampled (**162-164 ft piperun**). This area saw cesium-137 contamination in the laterals after an aggressive sluicing campaign in 1970. It is unknown if the cesium-137 was remobilized from a previous leak or if this represented a new leak from Tank A-105. The attendees discussed adding a new sample depth, 99-101 ft piperun below the 97-99 ft piperun sample due to a lack of other features of interest. The attendees agreed to the sample depth **78-80 ft piperun**.

Mr. Barnes inquired about the temperature profile and notes that the plot is in °F but the data appear to be in °C. Ms. Schuyler took the action to discuss the inconsistency with the logging contractor. Mr. Barned stated that he still expected the temperatures to be higher at this direct push location due to the extreme temperatures seen at the 216-A-106 Tank. In the past, temperature distribution was used as the initial indicator of a leak (before drywells or laterals were logged).

The attendees agree to sample depths **99-101** and **176-178 ft piperun**. Meeting attendees were not interested in sample collected at 66-68 or 192-194 ft piperun. Ms. Skorska was interested in collecting the 105-107 ft piperun sample due to its location below the gross gamma anomaly at ~94 to 104 ft piperun. Mr. Barnes identified that he thought the cesium-137 contamination seen in drywell 10-05-02 was caused by "dragged down" at the time the drywell was installed. Ms. Schuyler pointed out that this would be a good opportunity to verify contamination is not present in the area. The attendees agreed to the **105-107 ft piperun** sample depth. The attendees agreed that it is ok to collect three samples (97-99, 99-101, and 105-107 ft piperun) over a limited spatial range. The attendees discussed and agreed to collect only six deep samples at this location and agreed that and additional sample may be collected at another location.

Rod Lobos inquired about the sampling methodology with the direct push. Ms. Tabor explained sampling is conducted using a dual-string sampling system consisting of inner and outer strings deployed by small-diameter push rods. A sampler is attached to the inner string, returned to the bottom of the outer casing/push tubing, where it is "pushed" through the sample interval. Ms. Tabor also discussed the strategy of using the twin borehole approach: one push to geophysical log, the second push location (for sampling) is adjacent to the logging hole.

Ms. Skorska discussed a tool (beta probe) that was developed for the tank farms, which could quantify radionuclides and potentially reduce analytical testing. Ms. Tabor suggested discussing further in the next Tri-Party Agreement Milestone M-045-56 (Interim Measures) annual meeting.

The list of sample depths were re-read to the meeting attendees and all parties concurred with the list of sample depths identified in Table 1.

Table 1. Sample Depths Selected for C9395/C9396

Sample depth (ft piperun)	Reason	Stratigraphy
78-80	Increased moisture and gamma peak (near transition backfill/H1)	H1
97-99	Gamma peak increased (near area of casing corrosion at drywell 10-05-02, ~64 ft bgs)	
99-101*	Additional characterization in the unusual gamma spike	
105-107	Below area of contamination seen in drywell 10-05-02	
162-164	Below area of contamination seen in laterals, area of increased moisture and total gamma	H2
176-178	Highest moisture peak in apparent fine-grained material	

*This depth was not originally identified in Attachment 1

The following is the information was presented to Ecology during the meeting:

- Handout "Attachment 1"
- Summary of rationale and general notes to support sample depth selection for C9396 (see Tables 1 in Attachment 1).
- Copy of Figure 5-1 ("Direct Push Locations for WMA A-AX Focus Area 1") from RPP-PLAN-62041.
- Draft Spectra Gamma & Moisture Surveys (geophysical logs) in piperun depth for C9395.The logs show the proposed sample depths along with lithologic/stratigraphic unit information.
- One cross sections showing the relative location of the C9395/C9396 borehole path and sample depths with respect to the 241-A-105 Tank.
- Hard copies of Draft field geophysical logging results (gamma, moisture, temperature) from C9395.

Action Items:

- Ms. Schuyler check with the geophysical logging contractor and verify the units on the temperature log profile. Mr. Tabor will provide the answer to meeting attendees via email. [Completed 3/19/19].

Rodrigo Lobos		4/10/19
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Michael Barnes	Michael W Barnes	4-11-19
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

WMA A-AX Focus Area Sample Depth Meeting – C9396
March 19, 2019

Sampling Hole

C9396: Surface and Surface Duplicate, 7-9 ft bgs, and 12-14 ft bgs sample collected.

Data Evaluated to Help Determine Possible Sample Depths:

- Gamma, moisture, and temperature data for C9395 (45° angle push)
- Note: Plots are available in Vertical Depth (ft bgs) and Piperun Depth for C9395 since this is angle push.
- Vertical profile and cross section view of sample depths for C9395 (for depth perspective and relationship to tank)
- Relevant available dry well logging information (10-05-02)
- Sample depth information from C9386 and C9394.

General Notes:

- The basis for standard sampling is described in RPP-RPT-60227, DQO Report WMA A-AX, Rev. 0 (Focus Area 1), which indicates that these samples are to be collected from:
  - Recommending 10 sample depths: 3 sample depths of - surface, 7-9, and 12-14 ft bgs (vertical depths) and 7 deeper samples (intervals recommended are identified in Table 1).
  - Specific information on shallower intervals for the 45° angle of C9396:
    - 7 to 9 ft bgs is equivalent to 10 to 12 ft of piperun
    - 12 to 14 ft bgs is equivalent to 17 to 19 ft of piperun

Table 1: Sample Depth Recommendations for C9395/C9396

Judgmental		Stratigraphy	Random
Recommended Sample Depth (ft piperun)	**Reason**		**Recommended Sample Depth (ft piperun)**
NA	NA	Backfill	25-27
			27-29
66-68	Below pipeline		45-47
78-80	Increased moisture and gamma peak (near transition backfill/H1)	H1	81-83
97-99	Gamma peak increased (near area of casing corrosion at drywell 10-05-02, ~64 ft bgs)		117-119
105-107	Below area of contamination seen in drywell 10-05-02		142-144
162-164	Below area of contamination seen in laterals, area of increased moisture* and total gamma	H2	163-165
176-178	Highest moisture peak in apparent fine-grained material		
192-194	Bottom of sampling hole		

Note: The following are the stratigraphic units identified from logging hole C9395 (in ft bgs):
Backfill = 0-52, H1 = 52-104, H2 = 104-124.
NA = not applicable
*Moisture reading approximately 18%.

WMA A-AX Focus Area 1 Sample Depth Meeting #3

~~DRAFT~~
KS 5/10/19

MEETING NOTES

WMA A-AX Focus Area 1 Sample Interval Selection Meeting – C9392

Meeting Date: April 11, 2019

Location: 2440 Stevens Center Boulevard, Room 1600, Richland, WA

ATTENDEES:

Cindy Tabor (WRPS)
Dave Becker (WRPS)
Rod Lobos (DOE-ORP)
Mike Barnes (Ecology)
Kim Schuyler (Freestone)

BACKGROUND:
This meeting was part of the continuing effort to ensure communication between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions (WRPS) representatives regarding characterization activities in Waste Management Area A-AX. Specifically RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* states that "geophysical logging data along with any available quick turnaround analysis results ("quick turn") for two mobile contaminants (technetium-99 and nitrate) will be used to aid in determining subsurface sample depths. The subsurface sampling horizons will be selected in an open meeting to which WRPS staff, DOE-ORP, Ecology, U.S. Environmental Protection Agency (EPA), and other site contractors shall be invited."

Purpose of Meeting: This meeting was called to review geophysical logging data results from direct push location C9391, discuss the sample depth selection process, and agree upon sample depth intervals for C9392. It was also used to document the slight movement in the C9387/C9388 location.

Discussion: Ecology was provided information on one direct push location in A Farm (exploratory direct push location C9391). This location had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, and thorium data, and historical information were used to select sample depths. A map of WMA A-AX was presented and Ms.Tabor identified C9391/C9392 as the location in which sample depths were to be selected. Tank 241-A-105 is the target of characterization for this location.

Sample Selection at C9392 location:
A hard copy plot of C9391 gross gamma and moisture geophysical logging data was presented. Sample depths were overlain on the geophysical data plot. Ms. Tabor noted that sample depths are measured in ft length of piperun as opposed to ft below ground surface. The piperun measurement is the reference point used by the field sampling crew identify sample depth intervals in the field. A map view depicting the actual direct push paths of C9391, C9393, and C9395 was shown to provide a brief update on field progress. To facilitate sample depth selection, the map also showed the approximate extent of contamination, maximum temperature and depth seen at four of the direct push locations, and the apparent surface location of proposed samples at C9392. Ms. Tabor provided a graphic depicting historical gamma logging results for the corroded drywell 10-05-10 (299-E25-66). The cause of casing

corrosion at this drywell is of interest to the meeting attendees. Location C9391 extended to 225 ft below ground surface (bgs) (279 ft piperun). This location did not encounter the Hanford formation unit 3 or the Cold Creek unit.

Per RPP-PLAN-62041, three shallow depths will be collected: surface, 8 to 10 ft of piperun (equivalent to 7 to 9 ft bgs), and 14 to 16 ft of piperun (equivalent to 12 to 14 ft bgs).

Mr. Barnes inquired if any unique signatures (energy levels) were noted by the geophysical logging contractor. Ms. Tabor explained that input from Dr. Randall (geophysical logging contractor) has been requested on this issue. Field plots depicting total gamma and percent moisture and a temperature plot for C9391 were shown. Mr. Barnes noted that if the temperature profile were only from decay in the vadose zone soils, the expected temperature would be approximately 50 °C. He identified that the temperature plot for location C9391 may include decay from waste contained in Tank 241-A-105.

The sample depths and rationale identified in Table 1 of Attachment 1 were discussed. It was noted that backfill is present until approximately 41 ft piperun, Hanford formation unit 1 is present from 41 to 113 ft piperun, and Hanford formation unit 2 is present from 113 to 279 ft piperun. Mr. Barnes inquired about the distance from the maximum temperature seen at location C9391 to the base of Tank 241-A-105. Ms. Schuyler stated it was approximately 15 to 18 ft and corresponds to the sample depth identified at 60 to 62 ft piperun. The meeting attendees agree to the sample interval of **60 to 62 ft piperun**. An additional sample depth interval (54 to 56 ft piperun) was discussed due to an increase in total gamma and moisture data and relative distance to the base of the tank (approximately 25 ft). The attendees agree to add the **54 to 56 ft piperun** sample interval to the list. Mr. Barnes indicated that results from these two sample intervals (54 to 56 ft piperun and 60 to 62 ft piperun) might help determine if there were multiple leaks in the side of the tank. He stated that with multiple leak sites and 50 years of heat from the sludge that the concrete is probably shattered, making retrieval problematic. The meeting attendees also agree to sample depths **113 to 115 ft piperun, 158 to 160 ft piperun, and 190 to 192 ft piperun**.

An unusual gamma and moisture signature is present from 254 ft piperun and continues to the total depth of 279 ft piperun. The signature indicates a facies change that is not evident in the other WMA A-AX Focus Area 1 locations. The meeting attendees agreed to the collection of the last three sample intervals on Table 1 of Attachment 1: **254 to 256 ft piperun, 262 to 264 ft piperun, and 266 to 268 ft piperun.** The total number of selected sample depth intervals is eight rather than seven. It was identified that during the C9396 sample depth meeting on 3/19/2019, there was agreement that one of the seven deep samples would not be collected at this location. It was also identified in that meeting that an additional deep sample depth may be collected from a different direct push location. It was decided that the additional sample interval would be collected at C9392.

The list of sample depths were re-read to the meeting attendees and all parties concurred with the list of sample depths identified in Table 1 (below).

Table 1. Sample Depths Selected for C9391/C9392

Sample depth (ft piperun)	Reason	Stratigraphy
54-56*	Elevated total gamma and moisture peak in H1 above base of tank, near highest temperature	H1
60-62	Elevated total gamma and moisture peak in H1 near base of tank and highest temperature	
113-115	H1/H2 contact, increased moisture and total gamma underneath drywell, possible leak area	H2
158-160	Elevated total gamma (from 158 ft to 204 ft piperun), area of increased moisture before decrease in moisture, underneath lateral, possible leak area.	
190-192	Targeting maximum total gamma in push, underneath lateral, possible leak area.	
254-256	High moisture with increased total gamma at deeper depth, higher conductivity area.	
262-264	Low moisture with increased total gamma at deeper depth, higher conductivity area.	
266-268	Increase in gamma and moisture, higher conductivity area.	

*This depth was not originally identified in Attachment 1

Review Available Quick Turn Results:

Preliminary quick turn results from three depths at C9396, ten depths at C9394, and ten depths at C9386 were discussed. Mr. Barnes commented on the elevated pH measurements at C9394 and indicated that the pH would have been higher, if the contamination was from the tank. He indicated that he suspected there could be another source of contamination. He requested a diagram of the pipes near Tank 241-A-105. **Action: Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes.**

It was noted that only one depth at one location had a detect of technetium-99. Mr. Barnes was not surprised about the technetium-99 result because the levels were low in the liquid tank waste; most of the technetium-99 is in the salt cake. He indicated that pH is a better tracer of tank leaks because the salts would not migrate through the vadose zone but the mobile contaminants could. It was recommended that samples be collected near pipelines, look for pH measurements above 10 to show the source of contamination is the tank. He also stated elevated levels of sodium and nitrate would indicate a tank leak, and this conclusion is discussed in a PNNL report (UPR 200-E-86 and UPR 200-E-86 investigation at WMA C).

New Surface Location and Direct Push Path for C9387/C9388:

The surface location of C9387/C9388 was moved approximately 24 ft south and 2.6 ft to the east. The azimuth would change from 152 to 150 degrees from north and the closest distance to the tank would be 10.3 ft. Ms. Tabor identified that the distance from the tank was originally 28 ft in the sampling plan and this only thing that changed in Table 5-1 (i.e., target depth, piperun, and angle of the push did not change). Ms. Tabor provided a map view and cross sectional view of the change in

the direct push path. Ms. Tabor explained that due to tank farm activities and subsurface obstructions, no other location would meet the objectives of the DQO at C9387/C9388. The meeting attendees agreed that the new location is acceptable.

Mr. Barnes inquired about the possibility of placing subsurface electrodes at this location. The interest was due to concern that the concrete base of Tank 241-A-104 may be shattered. The electrodes may provide data to support this conclusion. Ms. Tabor stated that electrodes would be installed at this location.

The following is the information was presented to Ecology during the meeting:

- Handout "Attachment 1"
- Summary of rationale and general notes to support sample depth selection for C9392 (see Tables 1 in Attachment 1).
- A draft map depicting the actual direct push paths of C9391, C9393, and C9395. The map also showed the approximate extent of contamination, maximum temperature and depth seen at four of the direct push locations, and the apparent surface location of proposed samples at C9392.
- Draft Spectra Gamma & Moisture Surveys (geophysical logs) in ft piperun depth for C9391. The logs show the proposed sample depths along with lithologic/stratigraphic unit information.
- A draft cross section showing the relative location of the C9391/C9392 borehole path and sample depths with respect to the Tank 241-A-105.
- Hard copies of draft field geophysical logging results (gamma, moisture, temperature) from C9391.
- A draft map and cross section view comparing the original and new location and path for C9387/C9388.
- Table of available preliminary quick turn results from C9396, C9394, and C9386.

Action Items:
Action: Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes.

Rodrigo Lobos	[signature]	5-8-2019
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Michael W. Barnes	Michael W Barnes	5-6-2019
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

WMA A-AX Focus Area Sample Depth Meeting – C9392
April 11, 2019

Sampling Hole

C9392: Surface, 7-9 ft bgs, and 12-14 ft bgs sample collected.

Data Evaluated to Help Determine Possible Sample Depths:

- Gamma, moisture, and temperature data for C9391 (30° angle push)
  Note: Plots are available in Vertical Depth (ft bgs) and Piperun Depth for C9392 since this is angle push.
- Vertical profile and cross section view of sample depths for C9392 (for depth perspective and relationship to tank)
- Relevant available dry well logging information (10-05-10 – corrosion at 64 ft bgs and Cs-137 from 76 to 86 ft)
- Sample depth information from C9386, C9394, and C9396.
- Logs from C9385, C9393, and C9395.

General Notes:

- The basis for standard sampling is described in RPP-RPT-60227, DQO Report WMA A-AX, Rev. 0 (Focus Area 1), which indicates that these samples are to be collected from:
  - Recommending 10 sample depths: 3 sample depths of - surface, 7-9, and 12-14 ft bgs (vertical depths) and 7 deeper samples (intervals recommended are identified in Table 1).
  - Specific information on shallower intervals for the 30° angle of C9392:
    1. 7 to 9 ft bgs is equivalent to 8 to 10 ft of piperun
    2. 12 to 14 ft bgs is equivalent to 14 to 16 ft of piperun

Table 1: Sample Depth Recommendations for C9391/C9392

Judgmental		Stratigraphy
Recommended Sample Depth (ft piperun)	**Reason**	
60-62	Elevated total gamma and moisture peak in H1 Near Base of Tank and Highest Temperature	H1
113-115	H1/H2 contact, increased moisture and total gamma Underneath Drywell Possible Leak Area	H2
158-160	Elevated total gamma (from 158 ft to 204 ft), area of increased moisture before decrease in moisture. Underneath Lateral Possible Leak Area	
190-192	Targeting maximum total gamma in push Underneath Lateral Possible Leak Area	
254-256	High moisture with increased total gamma at deeper depth Higher conductivity area.	
262-264	Low moisture with increased total gamma at deeper depth. Higher conductivity area.	
266-268	Increase in gamma and moisture. Higher conductivity area.	

Note: Stratigraphy is presented in ft of piperun.
Backfill = 0-~41 (based on additional information from C9393, H1 = 41-113, H2 = 113-279).

MEETING NOTES

WMA A-AX Focus Area 1 Sample Interval Selection Meeting – C9388

Meeting Date: June 19, 2019

Location: 2440 Stevens Center Boulevard, Room 1200, Richland, WA

ATTENDEES:

Cindy Tabor (WRPS)
Dave Becker (WRPS)
Rod Lobos (DOE-ORP)
Mike Barnes (Ecology)
Kim Schuyler (Freestone)
Maria Skorska (Ecology)
Jon Lindberg (Ecology)

BACKGROUND:
This meeting was part of the continuing effort to ensure communication between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions (WRPS) representatives regarding characterization activities in Waste Management Area A-AX. Specifically RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)* states that "geophysical logging data along with any available quick turnaround analysis results ("quick turn") for two mobile contaminants (technetium-99 and nitrate) will be used to aid in determining subsurface sample depths. The subsurface sampling horizons will be selected in an open meeting to which WRPS staff, DOE-ORP, Ecology, U.S. Environmental Protection Agency (EPA), and other site contractors shall be invited."

Purpose of Meeting: This meeting was called to review geophysical logging data results from direct push location C9387, discuss the sample depth selection process, and agree upon sample depth intervals for C9388.

Discussion:
Ms Tabor started the meeting by discussing and action from previous sample depth selection meeting:

> **Action:** Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes ("WMA A-AX Focus Area 1 Sample Depth Meeting #3", held on April 11, 2019).

It was identified that Mike Barnes closed out the action item himself on June 11 by forwarding a figure with the pipelines to Ms. Tabor. Additional discussion on pipelines included the general depth of pipelines (15 ft below ground surface) and that the Nuclear Regulatory Commission was expressing an interest in pipelines.

Ecology was provided information on exploratory direct push location C9387. This location had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, and thorium data, and historical information were used to select sample depths. A map of WMA A-AX was presented and Ms.Tabor and Ms Schuyler identified C9387/C9388 as the location in which sample depths were to be selected. Tank 241-A-104 is the target of characterization for this location.

Sample Selection at C9387 location:
A hard copy plot of C9391 gross gamma and moisture geophysical logging data was presented. Sample depths were overlain on the geophysical data plot. It was noted that sample depths are measured in ft length of piperun as opposed to ft below ground surface. The piperun measurement is the reference point used by the field sampling crew identify sample depth intervals in the field. A map view depicting the actual direct push paths of C9392, C9394, and C9396 and sample depths was shown to provide a brief update on field progress. To facilitate sample depth selection, the map also showed the approximate extent of contamination, maximum temperature and depth seen at five of the direct push locations, and the apparent surface location of proposed samples at C9388.

Per RPP-PLAN-62041, three shallow depths will be collected: surface, 9 to 11 ft of piperun (equivalent to 7 to 9 ft bgs), and 15 to 17 ft of piperun (equivalent to 12 to 14 ft bgs). The depths and rationale identified in Table 1 of Attachment 1 were discussed and agree upon for sampling.

Table 1: Sample Depth Recommendations for C9387/C9388

Judgmental		Stratigraphy
Recommended Sample Depth (ft piperun)	**Reason**	
63-65	High moisture peak[a] and contact between backfill/H1 (undifferentiated) and H2.	H2
124-126	Below area of contamination noted in RPP-PLAN-62041[b].	
141-143	Beneath tank A-104 and near area of contamination noted in RPP-PLAN-62041[b].	
161-163	High moisture signature, H2 upper/lower contact, below area of contamination noted in RPP-PLAN-62041[b].	
184-186	Beneath tank A-104, determine if contamination is present at deep depth.	
203-205	Below edge of the tank A-104, determine if contamination is present at deep depth.	
290-292	High moisture peak[a].	

Note: The following are the stratigraphic units identified from logging location C9387 (in ft **piperun**):

Backfill/H1 undifferentiated = 0 - 63, H2 = 63 – 296.

a. Moisture measurement approximately 22%.
b. See Figure 1-2 in RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)*.

There was a general discussion on the various recommended sample depths including the possibility of sampling at 281-283 ft piperun rather than the deeper depth of 290-292 ft piperun. Ultimately, the group agreed upon sampling at the deeper depth where the log showed a higher moisture peak. It was also identified that the highest temperature in the log was near the recommended sample depth of 63-65 ft piperun.

ROD LOBOS		7-11-19
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Michael W Barnes	Michael W Barnes	7-9-19
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

Sampling Hole

C9388: Surface, 7-9 ft bgs, and 12-14 ft bgs sample collected.

Data Evaluated to Help Determine Possible Sample Depths:

- Gamma, moisture, and temperature data for C9387 (35° angle push)
  Note: Plots are available in Vertical Depth (ft bgs) and Piperun Depth for C9387 since this is angle push.

- Vertical profile and cross section view of sample depths for C9387 (for depth perspective and relationship to tank)
- Sample depth information from C9386, C9392, C9394, and C9396.
- Logs from C9385, C9391, C9393, and C9395.

General Notes:

- The basis for standard sampling is described in RPP-RPT-60227, DQO Report WMA A-AX, Rev. 0 (Focus Area 1), which indicates that these samples are to be collected from:
  - Recommending 10 sample depths: 3 sample depths of - surface, 7-9, and 12-14 ft bgs (vertical depths) and 7 deeper samples (intervals recommended are identified in Table 1).
  - Specific information on shallower intervals for the 35° angle of C9388:
    1. 7 to 9 ft bgs is equivalent to 9 to 11 ft of piperun
    2. 12 to 14 ft bgs is equivalent to 15 to 17 ft of piperun

Table 1: Sample Depth Recommendations for C9387/C9388

Judgmental		Stratigraphy
Recommended Sample Depth (ft piperun)	**Reason**	
63-65	High moisture peak[a] and contact between backfill/H1 (undifferentiated) and H2.	H2
124-126	Below area of contamination noted in RPP-PLAN-62041[b].	
141-143	Beneath tank A-104 and near area of contamination noted in RPP-PLAN-62041[b].	
161-163	High moisture signature, H2 upper/lower contact, below area of contamination noted in RPP-PLAN-62041[b].	
184-186	Beneath tank A-104, determine if contamination is present at deep depth.	
203-205	Below edge of the tank A-104, determine if contamination is present at deep depth.	
290-292	High moisture peak[a].	

Note: The following are the stratigraphic units identified from logging location C9387 (in ft **piperun**):

Backfill/H1 undifferentiated = 0 - 63, H2 = 63 – 296.

c. Moisture measurement approximately 22%.
d. See Figure 1-2 in RPP-PLAN-62041, *Sampling and Analysis Plan for WMA A-AX Focus Area 1 (Tanks 241-A-104 and 241-A-105)*.

Action from previous sample depth selection meeting:

Ms. Tabor will obtain a figure with pipelines around Tank 241-A-105 and coordinate with Mr. Barnes ("WMA A-AX Focus Area 1 Sample Depth Meeting #3", held on April 11, 2019).

APPENDIX H

DIRECT PUSH LOCATION INFORMATION

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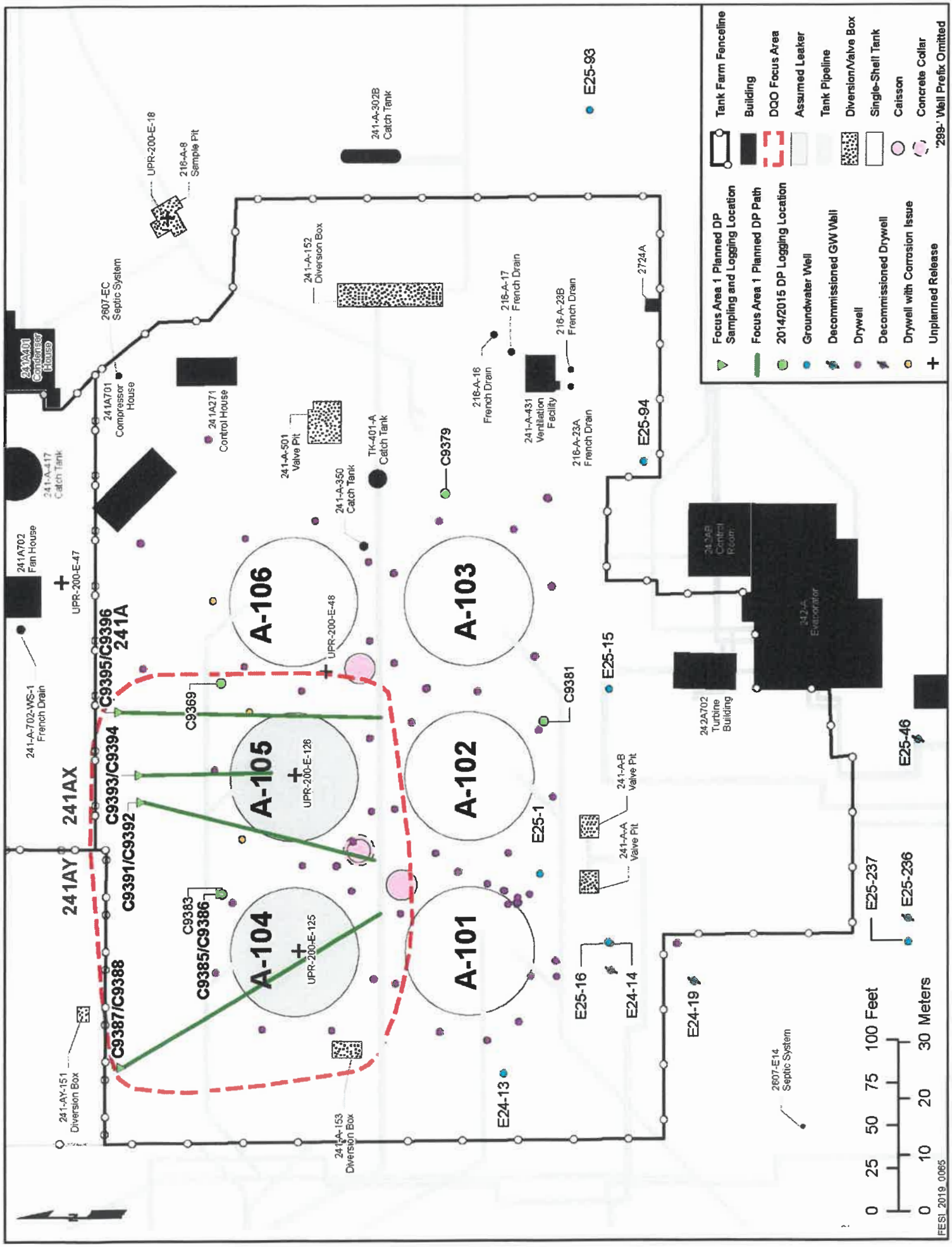

Tank Farm Fenceline
Building
DQO Focus Area
Assumed Leaker
Tank Pipeline
Diversion/Valve Box
Single-Shell Tank
Caisson
Concrete Collar
'299-' Well Prefix Omitted
Focus Area 1 Planned DP Sampling and Logging Location
Focus Area 1 Planned DP Path
2014/2015 DP Logging Location
Groundwater Well
Decommissioned GW Well
Drywell
Decommissioned Drywell
Drywell with Corrosion Issue
Unplanned Release
A-101
A-102
A-103
A-104
A-105
A-106
241A
241AX
241AY
241A401 Condenser House
241A701 Compressor House
241A271 Control House
241A702 Fan House
241-A-417 Catch Tank
2607-EC Septic System
UPR-200-E-18
216-A-8 Sample Pit
241-A-302B Catch Tank
241-A-152 Diversion Box
216-A-17 French Drain
216-A-23B French Drain
216-A-16 French Drain
216-A-23A French Drain
241-A-431 Ventilation Facility
2724A
241-A-501 Valve Pit
TK-401-A Catch Tank
241-A-350 Catch Tank
UPR-200-E-47
UPR-200-E-48
UPR-200-E-126
UPR-200-E-125
241-A-702-WS-1 French Drain
C9395/C9396
C9369
C9393/C9394
C9391/C9392
C9383
C9385/C9386
C9387/C9388
C9379
C9381
E25-93
E25-94
E25-15
E25-1
E25-46
E25-237
E25-236
E25-16
E24-14
E24-19
E24-13
241-A-B Valve Pit
241-A-A Valve Pit
242A702 Turbine Building
242-A Evaporator
241-AY-151 Diversion Box
241-A-153 Diversion Box
2607-E14 Septic System
0 25 50 75 100 Feet
0 10 20 30 Meters
FESI 2019 0065

SURVEY DATA FORM

Title/Affected Tank Farms: A Farm

Dome Elevation ☐ Civil ☒ Subsurface Investigations ☐

1. **Project Number:** N/A
2. **Job Number:** N/A

MICHAEL F. HARRINGTON | [signature] | 12/6/2019
3. **Prepared By:** (Print) (Sign) (Date)

4. **Requisition Number:** N/A

5. **Subcontract-Release Number:** 65928 (BNL RELEASE 7
6. **Number of Pages or Images:** 2

7. **Sub Contract Release Number:** Subcontract 2018-002 Release 7

DAVID BAHNAU | [signature] | 12-6-19
8. **Reviewer:** (Print) (Sign) (Date)

9. **Document/Project Title:** A Farm ANCILLARY EQUIPMENT SURVEY SUPPORT

10. **Change Description:** N/A

11. **Change Justification:** N/A

RECORDING DATA:

12. **What is the Purpose of the Survey?** Provide coordinates of earlier rerported data in metric units,re-stake location of DO012, incorporate driller's notes into report.

13. **Attached files** (copy of civil survey field log book notes, electronic survey data print outs, GPR ground scan data, coordinate tables, drawings) exhibit map, drillers notes

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) Drillers.PDF, 12619_M.PDF

15. **Control Monument References:** "PUG" NGS station PID:SA2402

16. **Benchmark References:** "PUG" NGS station PID:SA2402

17. **Identification Number(s) of Equipment Used:** Trimble R8-2 GPS receivers

18. **Survey Dates:** DEC 4, 2019

19. **Names of Personnel Performing the Work:** Michael Harrington P.L.S., Richard Rogers

20. **Weather Conditions:** Cloudy, calm, 35

21. **Calibration and Functional Check Information:** Check measurements to existing benchmarks and cobtrol.

22. **Horizontal and Vertical Survey Datum:** HORIZONTAL:WCS SOUTH NAD83/91 Ref. NAVD'88

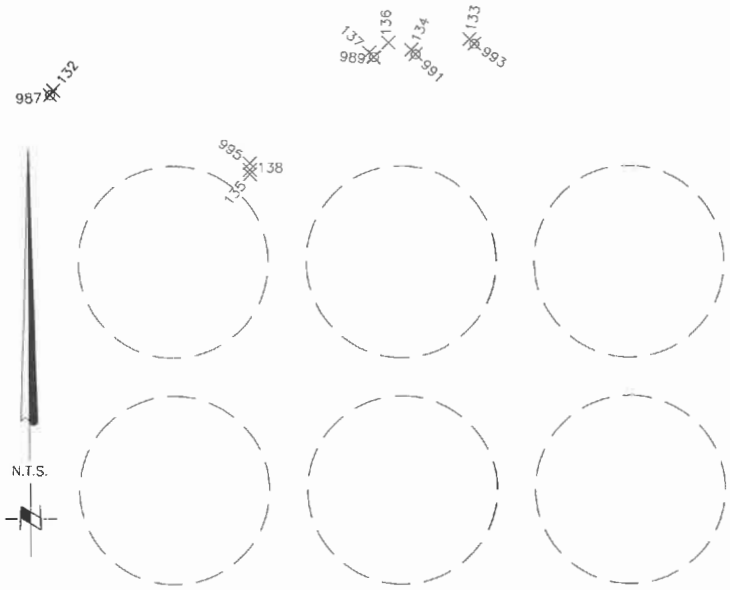
SURVEY RESULTS AND COMMENTS: See attached exhibits

PLS Stamp

MICHAEL F. HARRINGTON
STATE OF WASHINGTON
55516
REGISTERED
PROFESSIONAL LAND SURVEYOR

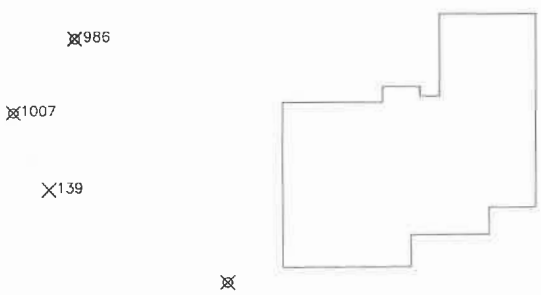
[signature]

EXHIBIT MAP
GEOTECHNICAL INVESTIGATION LOCATIONS



Point #	Raw Description	Northing	Easting	Elevation	Comments
132	C9388	136097.19	575305.76	211.1	Position computed from drillers notes, no evidence for survey location.
133	C9396	136104.23	575362.66	210.6	Position computed from drillers notes, no evidence for survey location.
134	C9394	136102.79	575354.67	210.6	Position computed from drillers notes, no evidence for survey location.
135	C9386	136085.80	575332.61	210.8	Position computed from drillers notes, no evidence for survey location.
136	C9392	136103.76	575351.57	210.6	Position computed from drillers notes, no evidence for survey location.
137	C9391A	136102.39	575348.93	210.6	Position computed from drillers notes, no evidence for survey location.
138	C9385	136086.43	575332.61	210.8	Position computed from drillers notes, no evidence for survey location.
139	D0012 STAKE	135980.66	575336.65	211.9	Stake location *1
986	D1005 STAKE	136001.41	575340.20	211.9	Stake location
987	C9387	136096.58	575305.31	211.1	Cable protectors on.
989	C9391	136101.78	575349.54	210.5	Cable protectors on.
991	C9393	136102.18	575355.28	210.7	Cable protectors on.
993	C9395	136103.62	575363.27	210.7	Cable protectors on.
995	C9383	136087.34	575332.61	210.8	Surface mark.
1007	D0007 STAKE	135991.32	575331.78	211.9	Stake location

*1 Stake location reset 12/4/2019.



NOTES

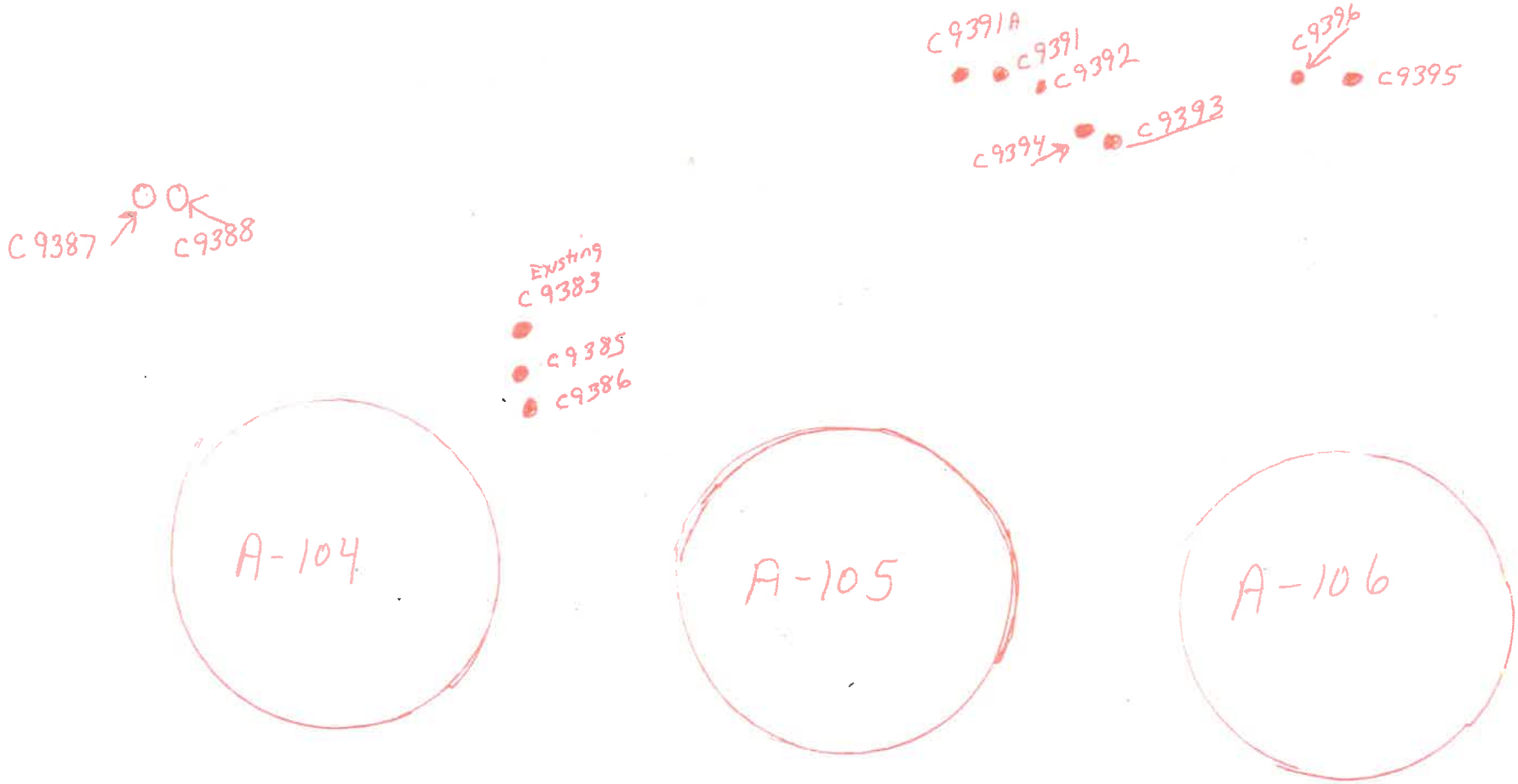
1) Field survey performed SEPT 23, & DEC 4, 2019
2) Horizontal datum & coordinate labeling : WCS South Zone NAD83/91 meters
3) Vertical datum & labeling : NAVD88 meters, based on elevation 231.5 at NGS station "PUG", PID : SA2402.

50 25 0 50 100 150

SCALE IN FEET

ROGERS SURVEYING INC.
1455 COLUMBIA DRIVE
RICHLAND, WA. 99352
PHONE (509) 783-4141
FAX: (509) 783-8994

12619_M.dwg



Cable protectors are on.

C9387
C9395
C9393
C9391

Sample hole locations

C9388 East 2 feet North 18 inches from C9387

C9396 West 2 feet North 2 Feet from C9395

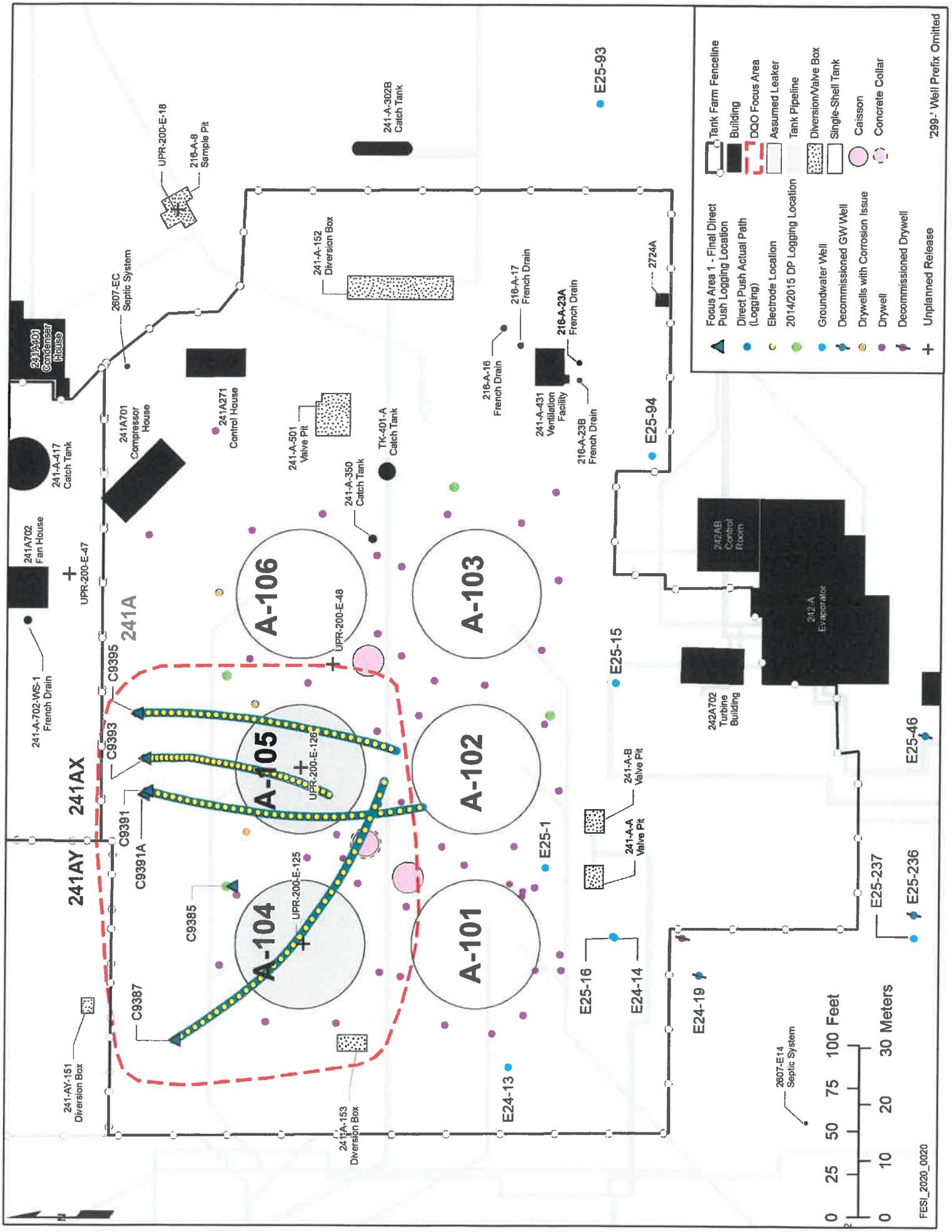
C9394 west 2 feet North 2 Feet from C9393

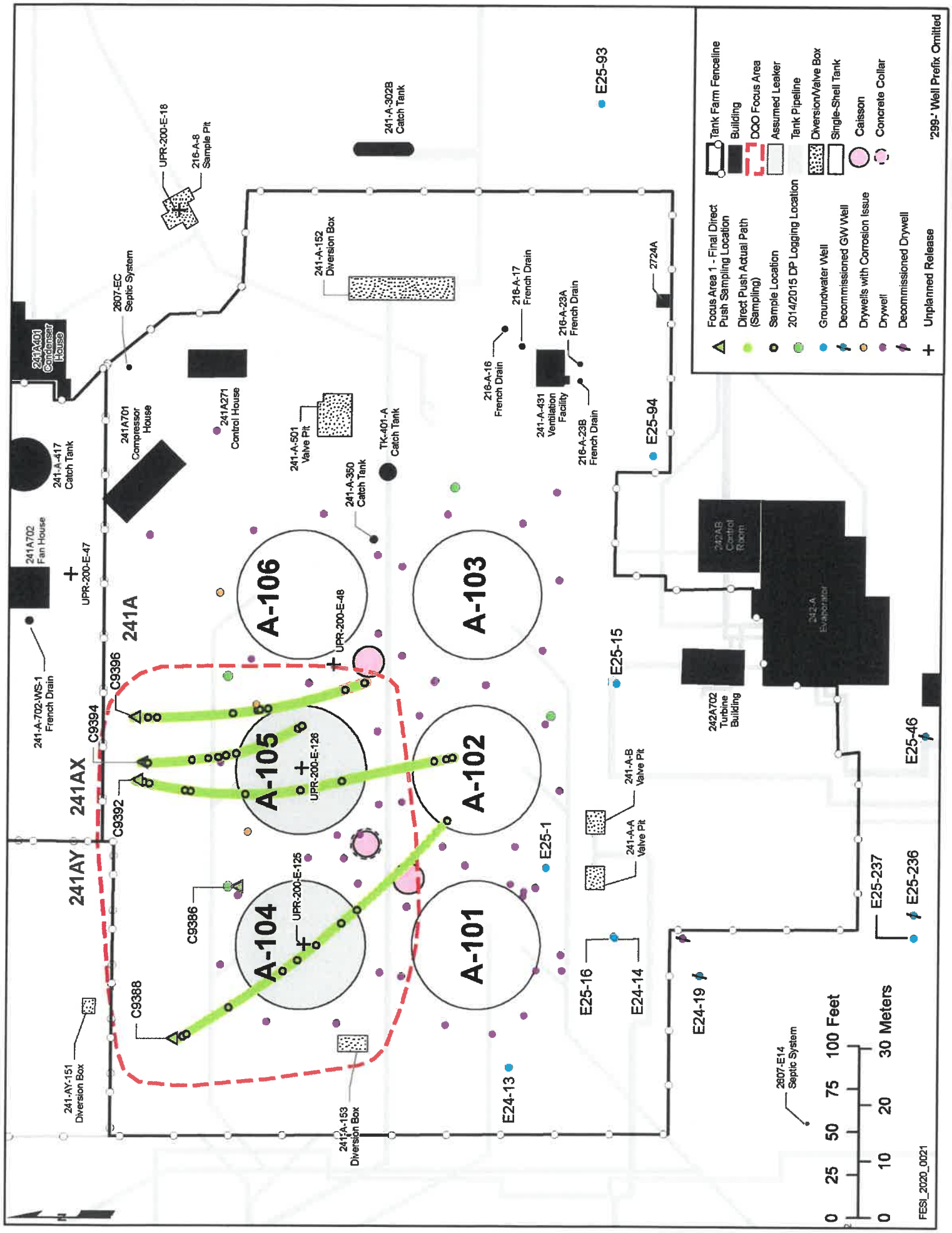
C9392 East 6 foot 8 inches North 6 Foot 6 inches from C9391

C9391A West 2 feet North 2 feet from C9391

C9385 South 3 feet From Existing C9383

C9386 South 3 feet From C9385.


Tank Farm Fenceline
Building
DQO Focus Area
Assumed Leaker
Tank Pipeline
Diversion/Valve Box
Single-Shell Tank
Caisson
Concrete Collar
'299-' Well Prefix Omitted
Focus Area 1 - Final Direct Push Logging Location
Direct Push Actual Path (Logging)
Electrode Location
2014/2015 DP Logging Location
Groundwater Well
Decommissioned GW Well
Drywells with Corrosion Issue
Drywell
Decommissioned Drywell
Unplanned Release
241A-401 Condenser House
2607-EC Septic System
UPR-200-E-18
216-A-8 Sample Pit
241A-302B Catch Tank
E25-93
241-A-152 Diversion Box
216-A-17 French Drain
216-A-23A French Drain
2724A
216-A-16 French Drain
241-A-431 Ventilation Facility
216-A-23B French Drain
E25-94
241A271 Control House
241A701 Compressor House
241-A-501 Valve Pit
TK-401-A Catch Tank
241-A-417 Catch Tank
241-A-350 Catch Tank
241A702 Fan House
UPR-200-E-47
241A
A-106
A-103
UPR-200-E-48
242AB Control Room
242-A Evaporator
E25-15
C9395
241-A-702-WS-1 French Drain
C9393
241AX
A-105
UPR-200-E-126
A-102
242A702 Turbine Building
E25-46
241-A-B Valve Pit
C9391
241AY
C9391A
241-A-A Valve Pit
E25-1
UPR-200-E-125
C9385
A-104
A-101
E25-237
E25-236
E25-16
E24-14
E24-19
C9387
241-AY-151 Diversion Box
241-A-153 Diversion Box
E24-13
2607-E14 Septic System
0 25 50 75 100 Feet
0 10 20 30 Meters
FESI_2020_0020


Tank Farm Fenceline
Building
DQO Focus Area
Assumed Leaker
Tank Pipeline
Diversion/Valve Box
Single-Shell Tank
Caisson
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'299-' Well Prefix Omitted
Focus Area 1 - Final Direct Push Sampling Location
Direct Push Actual Path (Sampling)
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241A702 Fan House
UPR-200-E-47
241-A-702-WS-1 French Drain
241A
A-106
A-103
UPR-200-E-48
C9396
C9394
241AX
A-105
UPR-200-E-126
A-102
C9392
241AY
A-104
UPR-200-E-125
A-101
C9386
C9388
241-AY-151 Diversion Box
241-A-153 Diversion Box
E24-13
E25-1
E25-15
E25-16
E24-14
E24-19
E25-46
E25-237
E25-236
241-A-B Valve Pit
241-A-A Valve Pit
242A702 Turbine Building
242-A Evaporator
2607-E14 Septic System
0 25 50 75 100 Feet
0 10 20 30 Meters
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APPENDIX I

SAFETY DOCUMENTATION

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ATKINS

JOB HAZARD ANALYSIS

			Signature and Date Required
Job Hazard Analysis #: **ET-SH-JHA-018**	Job Being Analyzed: **Access to Routine** Operational/Maintenance activities for Direct Push Field Work	**Facility & Location:** Various	Completed & Submitted By: John A Koch 10-31-18 Name Date
Revision #: Revision 0	Responsible Manager(s): Marty Gardner	Department: **Engineering Systems and Technology Projects**	Reviewed S&H Professional: John A Koch 10-31-18 Name Date
Date of Revision: 10/31/2018 **Expires: 10/31/2019**	Person Performing Analysis: John A Koch	PPE (Personal Protective Equipment) • Safety Glasses (*ANSI Z87.1 compliant.)* • Safety Footwear *(Steel toed or safety toed shoes will be worn during all Direct Push Operations)* • Hard Hat (*ANSI Z89.1 or Z89.2 as applicable)* **NOTE:** *Exceptions/Changes to PPE will be posted at the work location(s)*	Approved Responsible Manager: Marty Gardner 10-31-18 Name Date
Supplemental Training *(not otherwise listed, covered under required safety and health reading and presentations)* Material Handling 2014 GHS (Hazcom) Overview Fire Extinguisher Use/PASS Noise/Hearing Conservation Respiratory Protection Emergency Response Blood borne Pathogens	List Applicable Documents BT ~~ES~~-SH-PN-201, Hazardous Energy Control BT ~~ES~~-SH-PN-202, Electrical Safety Program BT ~~ES~~-SH-PR-303, Hazard Communications BT ~~ES~~-SH-PR-301, Blood borne Pathogens ET BKN 11-8-18		**NOTE:** ***This JHA is for Atkins personnel assigned to and conducting routine direct push operational/maintenance work at various field locations.***

The purpose of this JHA is to identify and analyze the hazards associated with routine operational/maintenance work that is typically performed during the Operational Phase of the Direct Push Activity. *Work or Operations not identified under this JHA is not authorized and require additional review.*

All personnel performing routine work/operations must read and acknowledge this document prior to performing the assigned work task.

The Responsible Manager (RM,) will control all operational work activities. The RM is the focal point for resolving issues regarding this analysis.

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1

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Electrical Power Portable Generators	• Electrical Shock • Re-fueling Portable Generators • Noise Hazards • Lifting	• Only personnel that are trained in the use of portable power generators will operate the equipment. • All equipment will be inspected by a qualified person prior to operation. • If the generator does not pass the pre-use inspection, it will be removed from service and repaired prior to use. • All re-fueling of the portable generator will be done by qualified personnel while the generator is not running. • Spill containment will be readily available while re-fueling portable generators. • Suitable means of disposal will be used for any items containing fuel residue. • All personnel operating portable power generators will use appropriate hearing protection. • All fuel cans will be properly stored in flammable lockers. • No smoking will be allowed within 50 feet of refueling operations. • Two-person lifts will be done when moving portable power equipment. • All electrical extension cords will be inspected and marked with the current inspection tags. If a defect is noted, the cord will be removed from service and replaced if damaged. • Care will be taken to not overload the capacity of the generator.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Site Preparation	• Ground cover • Fire Extinguisher placement • Work Site Boundaries • Drill Rig Placement • Tool use	• Prior to starting Direct Push operations, personnel will ensure all required tools are on site and available for use. • All tools will be inspected prior to use. Any items not passing inspection will be removed from service to be repaired or replaced. • Personnel will ensure appropriate ground cover is in place prior to starting Push operations. • Personnel will ensure a 20lb Fire Extinguisher is readily accessible. • Personnel will ensure all SDS' for chemical use is on-hand and reviewed prior to using any chemical or case sealing material. • All personnel will be trained in Fire Extinguisher use (PASS.) • A site walk down will be conducted prior to drill rig operation. Personnel will identify potential trip and fall hazards such as loose impediments, holes and loose soil. • Equipment will be placed/parked on stable, level ground to prevent rollout and tip over. • Boundaries will be established for drill rig operators and all others will be kept out of working area. • Personnel will ensure no underground utilities are in area of direct push operations. If necessary, call before you dig will be contact for verification. • A safe assembly area(s) will be noted for each work site. If an emergency arises, personnel will be directed to the assembly area for accountability and further instructions.
Personnel Protective Equipment (PPE)	• Hard hat • Gloves • Hearing Protection • Safety Glasses • Safety Shoes	• Personnel will ensure the appropriate PPE is worn during all Direct push operations. • Personnel will wear double hearing protection while standing near, or operating the drill rig while hammering. Double hearing protection will consist of foam ear plugs with a NRR of 33 and over the ear muffs. • Safety will perform area noise monitoring to ensure the adequacy of the hearing protection, and establish a hearing protection boundary for all other personnel. • Safety will ensure all personnel have a readily accessible supply of consumable PPE for all personnel.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Biological Hazards	• Rodents • Insects • Snakes • Spiders	• Ensure all equipment is inspected for signs of biological contamination (rodent droppings) prior to use. If contamination is found, ensure personnel clean/disinfect equipment prior to use. • Have appropriate repellant available for use, wasp spray, insect repellant etc. • Dispose of contaminated material appropriately. • Do not blind reach into areas/equipment. Visually inspect areas prior to hand placement
Chemical Handling & Use	• Acute/Chronic Illness • Sensitivity Reactions • Eye/Respiratory Hazards • Acute Exposure Potential • Waste Accumulation/Disposal	• All Personnel will review the appropriate SDS for all chemicals and case sealant materials prior to use. • The Field SDS binder will be available on site at all times. • If necessary, containers will be provided to capture/store material used to clean drill rig and associated equipment. • If needed, appropriate respiratory protection will be used by personnel handling case sealing material (Silica containing material) • Portable Eyewash bottles/station will be available to personnel in case of chemical contact with eyes. All eyewash solution will be inspected at least monthly.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Drill Rig Operations	• Overhead Hazards • Pinch Between Injuries • Struck-by and Crushing Hazards • Electrical Hazards • Dropped Loads • Pressurized Systems • Ergonomic Hazards • Cold Weather/Hot weather work	• Drill rig operators will control access to the drill rig at all times. • Unauthorized personnel will not be allowed around drill rig equipment without authorization. • No personnel will be allowed in the cab of the drill rig while drilling operations are in progress. • All equipment will be placed in a safe condition to render maintenance or repairs to equipment. • No repair work will be allowed on drill rig equipment until the equipment is rendered safe and de-energized. • Pre-use inspections will be done on all equipment prior to placing in service. • Personnel will ensure all high-pressure hoses and lines are inspected prior to commencing drilling operations. • If a leak is detected in a high-pressure line, work will immediately stop and the line depressurized prior to repair work. • Personnel will "warm up" prior to beginning direct push operations to minimize potential strains. • Kneeling mats/knee pads will be utilized as necessary. • Ensure personnel are acclimatized to work environment. Dress in appropriate layers for anticipated work activity • Replenishing fluids will be available for all personnel associated with direct push activities. • Warming/cooling area will be available for all personnel based upon current weather conditions.
Material Handling	• Strains, Sprains • Lacerations • Pinch Points • Unintentional Contact with fixed objects • Dropped Load • Tip-Over • Struck by/against • Crushing • Load Shift	• Use two-person lift protocols when moving heavy objects. • Use caution when handling drilling equipment as material may be hot • Personnel will wear appropriate gloves when material handling • Ensure work site is kept orderly to avid trip and fall hazards • When possible, excess material will not be stored or accumulated near drilling rig. • All material will be stockpiled and secured to prevent load shifting and rolling into personnel and drill rig.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Tool Use	• Electric Shock • Burns • Lacerations • Rotating Parts • Debris	• Personnel will ensure all electrical powered tools are inspected prior to use. All electrical powered tools will be double insulated and or used with a GFCI adapter. • No field made tools will be allowed for use. All tools will be used for their intended purpose • Personnel will use caution when placing tools against drill rig for removal of casing material. Ensure hands and fingers are not placed between tools and rig components. • Ensure field used tools are available for use and if necessary, personnel will assist drill operators with proper tool placement.
Noise Hazards:	• Noise Exposure > 85dBA	• During drill rig operations, personnel will wear double hearing protection. • Noise monitoring will be conducted to ensure that hearing protection used is adequate to protect workers. • Boundaries with signage will be established to protect personnel assisting drill rig operators. • All other personnel outside the double hearing protection boundary will wear a single level of hearing protection consisting of either foam ear plugs with an NRR of 33 or suitable ear muffs.
Work Around Rotating Equipment	• Crushing Injuries • Amputations • Lacerations • Pinch Points • Caught in/by	• Guards will remain on all system components while in operations. Extremities will not be within 6 inches of a rotating or moving portion of the system. • Guards may be removed after the system has been placed into a safe configuration and de-energized prior to handling. • Only personnel trained on the equipment specifics will be allowed to work on equipment with or without guards. • For component replacement (lynch pins,) personnel will follow the established guidelines for removal and replacement while the drill rig is on operation. • Personnel will ensure no loose clothing is worn and or near rotating equipment during rig operations. • Tools used to remove casing components will be inspected prior to use. If defects are noted, the tool will be removed from service and replaced.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Low Ambient Light Conditions	• Low-light environment	• During low-light conditions, employees shall wear high-visibility vests. • Supplemental lighting may be used during low light conditions or drilling operations may be halted until lighting is adequate. • Drill rig operators will help determine when and what lighting is necessary for continued safe operation of drill equipment.
Blood borne Pathogen Exposure	• Contact with blood or other potentially infectious material (OPIM) • Contact with contaminated personal protective equipment (PPE) • Contact with contaminated tools, equipment or work surfaces • Potential HBV and HIV exposure	• ALL employees will work under the concept of "Universal Precautions" when dealing with blood or OPIM spills. • Employees may, in the course of employment, injure themselves and bleed on work surfaces, tools or equipment. Within reason, if an employee can clean up their blood or OPIM spill, the employee will be directed to clean up after themselves using the supplied PPE and disinfecting solutions. • If an employee is injured, the employee will immediately report the injury to facility supervision and safety. If the injury involves a blood or OPIM spill the employee will immediately isolate the area from other employees and seek first aid from trained, on-site staff. • If the injury involves tools or equipment, and the tools or equipment are contaminated with blood or OPIM, the tool or piece of equipment will be identified to site First Aid trained staff to disinfect prior to placing back in service. • All PPE worn by personnel cleaning up a blood or OPIM spill will be discarded appropriately, either in a red bio-hazard bag, or sealed in plastic and thrown in the trash. • If a BBP kits is used to clean up blood or OPIM, the kit will immediately be replaced with a new, fully stocked kit.

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Emergency Contact Information

EMERGENCY MEDICAL SERVICES		
Organization	***Address and Hours***	***Phone No.***
Richland Emergency Services	24 Hr Emergency Contact	911
WorkCare Incident Intervention	24 Hr Reporting Hotline	888-449-7787
Worker Care of Pasco	1500 W Court St, Pasco, WA 99301 8AM-5PM	509-543-7717
Kadlec Medical Center	888 Swift Blvd, Richland, WA	(509) 946-4611

ATKINS EMERGENCY CONTACT INFORMATION		
Name	**Office Phone No.**	**Cell Phone No.**
Robert Allred, Safety and Health Manager	509-420-5447	505-927-1159
John A Koch, Project Safety and Health	509-420-5442	509-832-0265
Marty Gardner, Project Manager	509-420-5571	509-942-4244

ATKINS

JOB HAZARD ANALYSIS

			Signature and Date Required
Job Hazard Analysis #: **ET-SH-JHA-005**	Job Being Analyzed: **Access to Routine** Operational/Maintenance activities at the WRPS A Tank Farm Direct Push Field Work	Facility & Location: WRPS A Tank Farms	Completed & Submitted By: *John A Koch* 6/18/19 Name Date
Revision #: Revision 1	Responsible Manager(s): Marty Gardner	Department: Engineering Systems and Technology Projects	Reviewed S&H Professional: *John A Koch* 6/18/19 Name Date
Date of Revision: 06/17/2019 **Expires: 06/17/2020**	Person Performing Analysis: John A Koch	PPE (Personal Protective Equipment) • Safety Glasses (*ANSI Z87.1 compliant.)* • Safety Footwear *(Steel toed or safety toed shoes will be worn during all Direct Push Operations)* • Hard Hat (*ANSI Z89.1 or Z89.2 as applicable)* **NOTE:** *Exceptions/Changes to PPE will be posted at the work location(s)*	Approved Responsible Manager: *Marty Gardner* 6/8/19 Name Date
Supplemental Training *(not otherwise listed, covered under required safety and health reading and presentations)* Material Handling 2014 GHS (Hazcom) Overview Fire Extinguisher Use/PASS Noise/Hearing Conservation Respiratory Protection Emergency Response Blood borne Pathogens	List Applicable Documents ES-SH-PN-201, Hazardous Energy Control ES-SH-PN-202, Electrical Safety Program ES-SH-PR-303, Hazard Communications ES-SH-PR-301, Blood borne Pathogens IH Sample Plan #RETR-A-11 (WRPS) TFC-OPS-MAINT-C-01 TFC-EHSQ-RP-RWP-C-03 TVIS-A-001		**NOTE:** ***This JHA is for Atkins personnel assigned to and conducting routine direct push operational/maintenance work at the WRPS Tank Farms.***

The purpose of this JHA is to identify and analyze the hazards associated with routine operational/maintenance work that is typically performed during the Operational Phase of the Direct Push Activity. *Work or Operations not identified under this JHA is not authorized and require additional review.*

All personnel performing routine work/operations must read and acknowledge this document prior to performing the assigned work task.

The Responsible Manager (RM,) will control all operational work activities. The RM is the focal point for resolving issues regarding this analysis.

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Work Area/Activities:	Potential Hazards:	Preventive Measures:
Electrical Power Portable Generators	• Electrical Shock • Re-fueling Portable Generators • Noise Hazards • Lifting	• Only personnel that are trained in the use of portable power generators will operate the equipment. • All equipment will be inspected by a qualified person prior to operation. • If the generator does not pass the pre-use inspection, it will be removed from service and repaired prior to use. • All re-fueling of the portable generator will be done by qualified personnel while the generator is not running. • Spill containment will be readily available while re-fueling portable generators. • Suitable means of disposal will be used for any items containing fuel residue. • All personnel operating portable power generators will use appropriate hearing protection. • All fuel cans will be properly stored in flammable lockers. • No smoking will be allowed within 50 feet of refueling operations. • Two-person lifts will be done when moving portable power equipment. • All electrical extension cords will be inspected and marked with the current inspection tags. If a defect is noted, the cord will be removed from service and replaced if damaged. • Care will be taken to not overload the capacity of the generator.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Site Preparation	• Ground cover • Fire Extinguisher placement • Work Site Boundaries • Drill Rig Placement • Tool use	• Prior to starting Direct Push operations, personnel will ensure all required tools are on site and available for use. • All tools will be inspected prior to use. Any items not passing inspection will be removed from service to be repaired or replaced. • Personnel will ensure appropriate ground cover is in place prior to starting Push operations. • Personnel will ensure a 20lb Fire Extinguisher is readily accessible. • Personnel will ensure all SDS' for chemical use is on-hand and reviewed prior to using any chemical or case sealing material. • All personnel will be trained in Fire Extinguisher use (PASS.) • A site walk down will be conducted prior to drill rig operation. Personnel will identify potential trip and fall hazards such as loose impediments, holes and loose soil. • Equipment will be placed/parked on stable, level ground to prevent rollout and tip over. • Boundaries will be established for drill rig operators and all others will be kept out of working area. • Personnel will ensure no underground utilities are in area of direct push operations. If necessary, call before you dig will be contact for verification. • A safe assembly area(s) will be noted for each work site. If an emergency arises, personnel will be directed to the assembly area for accountability and further instructions. • WRPS will conduct a ground scan and furnish a site excavation permit prior to direct push operation beginning to ensure no contact with underground utilities is made.
Personnel Protective Equipment (PPE)	• Hard hat • Gloves • Hearing Protection • Safety Glasses • Safety Shoes	• Personnel will ensure the appropriate PPE is worn during all Direct push operations. • Personnel will wear double hearing protection while standing near, or operating the drill rig while hammering. Double hearing protection will consist of foam ear plugs with a NRR of 33 and over the ear muffs. • Safety will perform area noise monitoring to ensure the adequacy of the hearing protection, and establish a hearing protection boundary for all other personnel. • Safety will ensure all personnel have a readily accessible supply of consumable PPE for all personnel.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Biological Hazards	• Rodents • Insects • Snakes • Spiders	• Ensure all equipment is inspected for signs of biological contamination (rodent droppings) prior to use. If contamination is found, ensure personnel clean/disinfect equipment prior to use. • Have appropriate repellant available for use, wasp spray, insect repellant etc. • Dispose of contaminated material appropriately. • Do not blind reach into areas/equipment. Visually inspect areas prior to hand placement
Chemical Handling & Use	• Acute/Chronic Illness • Sensitivity Reactions • Eye/Respiratory Hazards • Acute Exposure Potential • Waste Accumulation/Disposal	• All Personnel will review the appropriate SDS for all chemicals and case sealant materials prior to use. • The Field SDS binder will be available on site at all times. • If necessary, containers will be provided to capture/store material used to clean drill rig and associated equipment. • If needed, appropriate respiratory protection will be used by personnel handling case sealing material (Bentonite.) outside of the A Tank Farm. • Personnel handling potential silica dust generating material in the Tank farm will already be utilizing full respiratory protection as stated in RETR-A-11 • Portable Eyewash bottles/station will be available to personnel in case of chemical contact with eyes. All eyewash solution will be inspected at least monthly.
Radiological Hazards	• Radiological Risk Screening	• Respiratory Protection FormA-6005-593 Method 1 will be provided by WRPS for additional guidance
Tank Farm Vapors	• Exposure to Potentially Harmful Tank Farm Vapors	• All personnel will perform work in accordance with TFC-OPS-MAINT-C-01 and TFC-ESHQ-RP-RWP-C-03, which is provided by WRPS. • All Personnel will use: TVIS- A-001 for guidelines for Tank Farm Vapor exposure control. Respiratory Protection Form A-6005-593. IH Sample Plan RETR-A-11, for Chemical Use

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Work Area/Activities:	Potential Hazards:	Preventive Measures:
Drill Rig Operations	• Overhead Hazards • Pinch Between Injuries • Struck-by and Crushing Hazards • Electrical Hazards • Dropped Loads • Pressurized Systems • Ergonomic Hazards • Cold Weather/Hot weather work	• Drill rig operators will control access to the drill rig at all times. • Unauthorized personnel will not be allowed around drill rig equipment without authorization. • No personnel will be allowed in the cab of the drill rig while drilling operations are in progress. • All equipment will be placed in a safe condition to render maintenance or repairs to equipment. • No repair work will be allowed on drill rig equipment until the equipment is rendered safe and de-energized. • Pre-use inspections will be done on all equipment prior to placing in service. • Personnel will ensure all high-pressure hoses and lines are inspected prior to commencing drilling operations. • If a leak is detected in a high-pressure line, work will immediately stop and the line depressurized prior to repair work. • Personnel will "warm up" prior to beginning direct push operations to minimize potential strains. • Kneeling mats/knee pads will be utilized as necessary. • Ensure personnel are acclimatized to work environment. Dress in appropriate layers for anticipated work activity • Replenishing fluids will be available for all personnel associated with direct push activities. • Warming/cooling area will be available for all personnel based upon current weather conditions. • Personnel will follow WRPS Heat Stress Mitigation Checklist Method 4 for work/rest cycles while working at the A Tank Farm.
Material Handling	• Strains, Sprains • Lacerations • Pinch Points • Unintentional Contact with fixed objects • Dropped Load • Tip-Over • Struck by/against • Crushing • Load Shift	• Use two-person lift protocols when moving heavy objects. • Use caution when handling drilling equipment as material may be hot • Personnel will wear appropriate gloves when material handling • Ensure work site is kept orderly to avid trip and fall hazards • When possible, excess material will not be stored or accumulated near drilling rig. • All material will be stockpiled and secured to prevent load shifting and rolling into personnel and drill rig.

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Work Area/Activities:	Potential Hazards:	Preventive Measures:
Tool Use	• Electric Shock • Burns • Lacerations • Rotating Parts • Debris	• Personnel will ensure all electrical powered tools are inspected prior to use. All electrical powered tools will be double insulated and or used with a GFCI adapter. • No field made tools will be allowed for use. All tools will be used for their intended purpose • Personnel will use caution when placing tools against drill rig for removal of casing material. Ensure hands and fingers are not placed between tools and rig components. • Ensure field used tools are available for use and if necessary, personnel will assist drill operators with proper tool placement.
Noise Hazards:	• Noise Exposure > 85dBA	• During drill rig operations, personnel will wear double hearing protection. • Noise monitoring will be conducted to ensure that hearing protection used is adequate to protect workers. • Boundaries with signage will be established to protect personnel assisting drill rig operators. • All other personnel outside the double hearing protection boundary will wear a single level of hearing protection consisting of either foam ear plugs with an NRR of 33 or suitable ear muffs. • IH Sample Plan RETR-A-11 will be provided by WRPS IH Staff for additional guidelines
Work Around Rotating Equipment	• Crushing Injuries • Amputations • Lacerations • Pinch Points • Caught in/by	• Guards will remain on all system components while in operations. Extremities will not be within 6 inches of a rotating or moving portion of the system. • Guards may be removed after the system has been placed into a safe configuration and de-energized prior to handling. • Only personnel trained on the equipment specifics will be allowed to work on equipment with or without guards. • For component replacement (lynch pins,) personnel will follow the established guidelines for removal and replacement while the drill rig is on operation. • Personnel will ensure no loose clothing is worn and or near rotating equipment during rig operations. • Tools used to remove casing components will be inspected prior to use. If defects are noted, the tool will be removed from service and replaced.

Work Area/Activities:	Potential Hazards:	Preventive Measures:
Low Ambient Light Conditions	• Low-light environment	• During low-light conditions, employees shall wear high-visibility vests. • Supplemental lighting may be used during low light conditions or drilling operations may be halted until lighting is adequate. • Drill rig operators will help determine when and what lighting is necessary for continued safe operation of drill equipment.
Blood borne Pathogen Exposure	• Contact with blood or other potentially infectious material (OPIM) • Contact with contaminated personal protective equipment (PPE) • Contact with contaminated tools, equipment or work surfaces • Potential HBV and HIV exposure	• ALL employees will work under the concept of "Universal Precautions" when dealing with blood or OPIM spills. • Employees may, in the course of employment, injure themselves and bleed on work surfaces, tools or equipment. Within reason, if an employee can clean up their blood or OPIM spill, the employee will be directed to clean up after themselves using the supplied PPE and disinfecting solutions. • If an employee is injured, the employee will immediately report the injury to facility supervision and safety. If the injury involves a blood or OPIM spill the employee will immediately isolate the area from other employees and seek first aid from trained, on-site staff. • If the injury involves tools or equipment, and the tools or equipment are contaminated with blood or OPIM, the tool or piece of equipment will be identified to site First Aid trained staff to disinfect prior to placing back in service. • All PPE worn by personnel cleaning up a blood or OPIM spill will be discarded appropriately, either in a red bio-hazard bag, or sealed in plastic and thrown in the trash. • If a BBP kits is used to clean up blood or OPIM, the kit will immediately be replaced with a new, fully stocked kit.

Emergency Contact Information

EMERGENCY MEDICAL SERVICES		
Organization	***Address and Hours***	***Phone No.***
Richland Emergency Services	24 Hr Emergency Contact	911
WorkCare Incident Intervention	24 Hr Reporting Hotline	888-449-7787
Worker Care of Pasco	1500 W Court St, Pasco, WA 99301 8AM-5PM	509-543-7717
Kadlec Medical Center	888 Swift Blvd, Richland, WA	(509) 946-4611

ATKINS EMERGENCY CONTACT INFORMATION		
Name	**Office Phone No.**	**Cell Phone No.**
Robert Allred, Safety and Health Manager	509-420-5447	505-927-1159
John A Koch, On-Site Safety and Health	509-420-5442	509-832-0265
Marty Gardner, Project Manager	509-420-5571	509-942-4244