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WMA A-AX Focus Area 1 Sample Depth Meeting #1

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com G. 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.

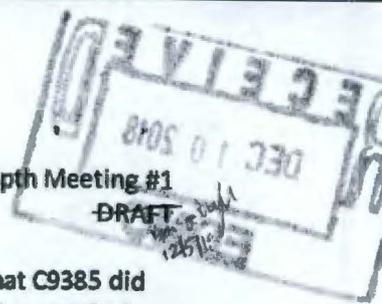
Discussion: Ecology was provided information on two direct push locations in A Farm (exploratory boreholes C9385 and C9393). Both exploratory boreholes had been pushed and geophysically logged. Logging results, which included total gamma, moisture, temperature, and spectral gamma (potassium, uranium, 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).

Field Work Status:

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

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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

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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	

^aIdentified 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.

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12/5/18

Table 2. Sample Depths Selected for C9393/C9394

Sample depth (ft bgs) Pipe run	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	

^aIdentified 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 Ostrom study about temperature propagation and predictions of vadose zone heat surrounding single-shell tanks.

<u>JAN B BOMER</u>	<u>JAN B BOMER</u>	<u>11/28/2018</u>
DOE Project Manager (print)	DOE Project Manager (signature)	Date
<u>Mike Bomer</u>	<u>Michael W Bomer</u>	<u>12-4-18</u>
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1

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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

^aFor vertical hole, information is in feet below ground surface (ft bgs). For angle holes, information is in ft pipe run.

^bA 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.

^cPipe 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

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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

^aSample depth was also selected from logging location C9383.

^bMoisture 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

^aHighest moisture area.