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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).

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).