MEETING NOTES

WMA A-AX Focus Area 2 D0006 Path Forward

Meeting Date: December 10, 2020

ATTENDEES:

Cindy Tabor (WRPS)
Paul Rutland (WRPS)
Becky Blackwell (DOE-ORP)
Kyle Rucker (Ecology)
Marysia Skorska (Ecology)
John Lindberg (Ecology)
Mike Barnes (Ecology)
Jeff Lyon (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. Department of Energy Office of River Protection (DOE-ORP), and Washington River Protection Solutions representatives regarding characterization activities in Waste Management Area (WMA) A-AX as described in RPP-PLAN-63020, Rev. 1, *Sampling and Analysis Plan for WMA A-AX Focus Area 2 (Southwestern Area of A Farm).* Within WMA A-AX, soil samples are collected using direct push (via hydraulic hammer) technology. This technology enabled access and mobility in the farm area and does not generate waste like other drilling method. One of the limitations to this type of technology is the depth to which it can successfully push and recover soil samples. During WMA A-AX data quality objectives and sample depth meetings with Ecology, DOE-ORP identified that the program would try to push to the required sample depths (at times exceeded 285 below ground surface [ft bgs]) but noted that this was pushing the limit of this technology and there may be issues. A reoccurring issue has been casing breaks deep underground.

Purpose of Meeting:
The purpose of this meeting is to discuss the reoccurring casing breaks at WMA A-AX Focus Area 2 direct pushes and specifically on the path forward on the D0006 location.

Discussion:
Cindy Tabor displayed a map of the WMA A-AX Focus Area 2 push locations (Figure 1-1 in RPP-PLAN-63020: Attachment 1) and identified that the meeting will be primarily to discuss the D0006 location. Ms. Tabor presented the information in Attachment 2.

Ms. Tabor identified that the purpose of sampling push D0006 is to investigate groundwater well corrosion in the southwestern area of A Farm. The corrosion present at groundwater wells 299-E24-19, 299-E25-46, and 299-E25-236 occurs at depths between 263 and 278.6 ft bgs. She identified the location of the three corroded groundwater wells in relation to D0006. She also said the WMA A-AX Focus Area 2 SAP (RPP-PLAN-63020) was transmitted to Ecology and is available in the Administrative Records.

The current status of field work at WMA A-AX Focus Area 2 pushes were discussed. Ms. Tabor noted that direct push IDs ending in an odd number are used for geophysical logging and direct push IDs ending in an even number are used for soil sampling. Highlighted activities include:

- Focus Area 2 location D0007 was pushed to the planned total depth of 290.0 ft bgs and all geophysical logging was complete.
- Sampling at D0008/D0008A had concluded. All sample intervals were successfully collected. Ms. Tabor noted that there was an error in Table 1 of the handout: the "Depth achieved" at D0008 should be identified as 214 ft bgs (it is corrected in Attachment 2).
- Focus Area 2 location D0005 was pushed to a total depth of 279.3 ft bgs. The push met refusal before reaching the planned total depth of 290.0 ft bgs. Ecology was notified a sample depth meeting for D0006 (meeting notes titled *WMA A-AX Focus Area 2 Sample Depth Meeting #2* [available in the Administrative Record]). All geophysical logging was completed.
- Sampling began at D0006. Most of the samples were collected before the casing broke. A more detailed discussion will be later in the meeting.

The following timeline for WMA A-AX Focus Area 2 was discussed. It was explained that field work began at D0007, followed by D0008. When D0008 had a casing break with the drill string at 214 ft bgs (the actual casing separation occurred at 99 ft bgs), the field crew was instructed to move off the D0008 push location and re-attempt pushing at D0008A. Once the D0008/D0008A sampling was complete (see Table 2 for sample depths), the crew moved to the D0005/D0006 location. D0005 was successfully pushed and logged before the field crew initiated sampling at D0006. The casing at D0006 broke and Ms. Tabor said that we are going through the same process we did for the D0008 casing breakage: meet with Ecology and discuss the appropriate path forward for the D0006 direct push (meeting notes titled *WMA A-AX Focus Area 2 Sample Depth Meeting #2* [available in the Administrative Record]).

Jeff Lyon asked if the casing breakage at 99 ft bgs was in the sampling hole and Ms. Tabor said "yes" and clarified that the direct push casing was down to 214 ft bgs but the failure itself was at a casing joint at 99 ft bgs. Mr. Lyon followed up with a question wondering how the remaining samples were collected from this location. Ms. Tabor said the direct push rig was relocated a few feet away from D0008 and the remaining samples were collected at D0008A. Table 2 shows which sample depths were collected from D0008 or D0008A and which samples were collected for the purpose of the "Special Study". Ms. Tabor also explained that the three shallow samples were recollected at D0008A because the original samples collected at D0008 exceeded all of the holding times due to laboratory restrictions caused by the pandemic.

Ms. Tabor moved on to discuss D0006 and presented the map (Figure 1-1 in RPP-PLAN-63020), which identified the location of this push. Sampling had been successful until the direct push casing was down to 181 ft bgs, at that time, the casing separated at a joint at 134 ft bgs. Kim Schuyler said there is no significance to the depth at which the breaks occur: it only shows the random weakest link in the casing. Ms. Tabor indicated the casing breaks at WMA A-AX Focus Area 2 pushes occurred at the threads. Ms. Tabor said the project still need to collect the last three sets of deep sample intervals plus one "Special Study" at 181-183 ft bgs.

Ms. Tabor provided additional on the casing breaks at D0008 and D0006. She stated that the project instructed the vendor (Mavrik) to perform evaluations and inspections on the broken piece of casing from D0008 to determine if the failures were due to a manufacturing issue. That specific piece of casing

had hardness and tread measurements well within the allowable tolerances. Two unused pieces of casing were also sent to the vendor for analyses, one tested within tolerance, one did not. The direct push subcontractor (Atkins) then set 600 ft of unused casing to the vendor for evaluation, initial results show casing sections have tolerances above, below and at specifications. The project also consulted with material scientists with metallurgy experience and their opinion was that the failures were most likely due to fatigue caused by flexing of the casing (causing extra stresses on the casing threads) at deeper depths.

Ms. Tabor then discussed the options for the path forward of the D0006 direct push. Ms. Tabor noted that during the initial DQO meetings with regulators, lessons learned from WMA C were discussed. One of the issues were that Ecology felt the deep vadose zone was not adequately characterized. Ecology recommended that samples should be collected to depths closer to the unconfined aquifer (over 290 ft bgs in some areas). Ms. Tabor noted that the deepest successful pushes at WMA C were between 220 and 240 ft bgs. The project identified that attempts to sample at depths greater that those achieved at WMA C would be attempted but there may be technical challenges because these deeper depths are at the limit of the design capability of the direct push technology used in the tank farms.

Ms. Tabor noted that there were also casing breakages at WMA A-AX Focus Area 1.

Ms. Tabor said there are two options on how to proceed at D0006:

a. Do not attempt another push at this location, do not collect the final samples.
b. Make one more attempt at this location (move a few feet away from D0006 and push D0006A), collect the final samples as originally agreed upon. Only the deeper samples not collected at D0006 would be collected at D0006A.

A drawback to Option a is that data gaps will not be identified until the RFI is developed. There is a risk of needed to go through another DQO process that shows those deeper samples need to be collected at that location. Ms. Schuyler noted that another purpose for collecting samples at the D0006 location is its position within the footprint of 200-E-286 Ditch (refer to Attachment 1). Ms. Tabor noted that WMA A-AX Focus Area 2 is comprised of sampling direct push locations (D0006 and D0008/D0008A) and one large diameter borehole/well (D0012). D0008/D0008A and the D0012 location include collecting samples from the depths near the casing corrosion, so there will be some data available, just not everything planned.

Ms. Tabor identified that a drawback to Option b is that the casing could break again and the samples still would not be collected and more casing would be left in the vadose zone. Ms. Tabor said Ecology has expressed concern about leaving multiple strings of casing in the vadose zone. Jon Lindberg clarified that he did not think this was a major issue. He doesn't think it is an issue because the casing is back-filled with bentonite so there is low risk of the casing acting as a conduit for liquid contamination migration. He also noted that the vadose zone at these depths have low moisture and is well above groundwater.

Ms. Tabor opens the meeting for discussion on the options.

- Mr. Lyon requested the map to be re-displayed, he wanted to know the location of the large diameter borehole/well (D0012) in relation to the WMA A-AX Focus Area 2 pushes.
- Mike Barnes stated that he wants to move a few feet away from D0006 and repush D0006A to 214 ft bgs before the final deep samples are collected. Ms. Tabor clarifies that is the intention with Option b.
- Mr. Lindberg states that he thinks the use of the direct push drilling technology can be risky, but agrees with Ms. Tabor that this technology has been very successful at other farms and these issues are related to the extremely deep depths we have been pushing at WMA A-AX.
- Mr. Lindberg stated that we should try to push again (Option b) and that it is worth another shop.
- Marysia Skorska indicated that Option a seemed reasonable. Ms. Skorska said we should look at the objective, you had a hypotheses that the corrosion was related to the 200-E-286 Ditch. It seems like you can use the data from D0008/D0008A. Mr. Lindberg responded that the 200-E-286 Ditch received cooling water and had high chloride content. Ms. Schuyler noted that the D0008/D0008A location is outside of the footprint of the 200-E-286 Ditch and that the vadose zone is highly transmissive. It is likely the waste did not have a large lateral extent, rather the waste traveled straight down, directly beneath the ditch. We need to be able to compare the sample results between the D0008/D0008A and D0006 specifically at the deeper depths. Mr. Lindberg concurred and said the Cold Creek unit is present at the depths in which the groundwater well casing corrosion occurred, stating we need to characterize it.
- Mr. Lindberg asked what DOE-ORP wanted to do. Becky Blackwell stated that it is good to note that if potential data gaps are identified in the RFI, we can collect more samples at a later date. Ms. Blackwell stated she was surprised that we already had another casing break and that Ms. Skorska made a great point that we may already have the data we need. She also liked the idea of stepping away from D0006 and researching new drilling technologies.
- Paul Rutland stated that beyond 150 ft bgs, we have broken casing at 1 in 10 locations. Mr. Lindberg asked if the casing only fails during sample collection. Ms. Tabor responded that the casing has failed at logging and sampling locations. Mr. Lindberg also asked what causes the flexing in the casing. Mr. Rutland said the amount of flexing is greater the deeper you push, regardless of logging vs. sampling pushes.

Ms. Tabor took a vote on which option the attendees prefer:

- Ms. Blackwell – Option a
- Ms. Skorska – Option a
- Mr. Lindberg – Option b, but noted that he isn't pushing hard for this option, he would be ok with Option a if that is what the group decided.
- Mr. Barnes – Option b and he felt very strongly about it. He noted that there are varying depths of casing corrosion in the area, plus PNNL is doing "Special Studies" at these pushes and those results will be available well before the onsite laboratory results.

Ms. Tabor offered another option: step away from D0006, move on to characterize T Farm, and research other drilling technologies we could use to collect the deep samples at D0006A. The direct pushes at T Farm will not exceed 100 ft bgs and the project has a high chance of success (no casing breakage).

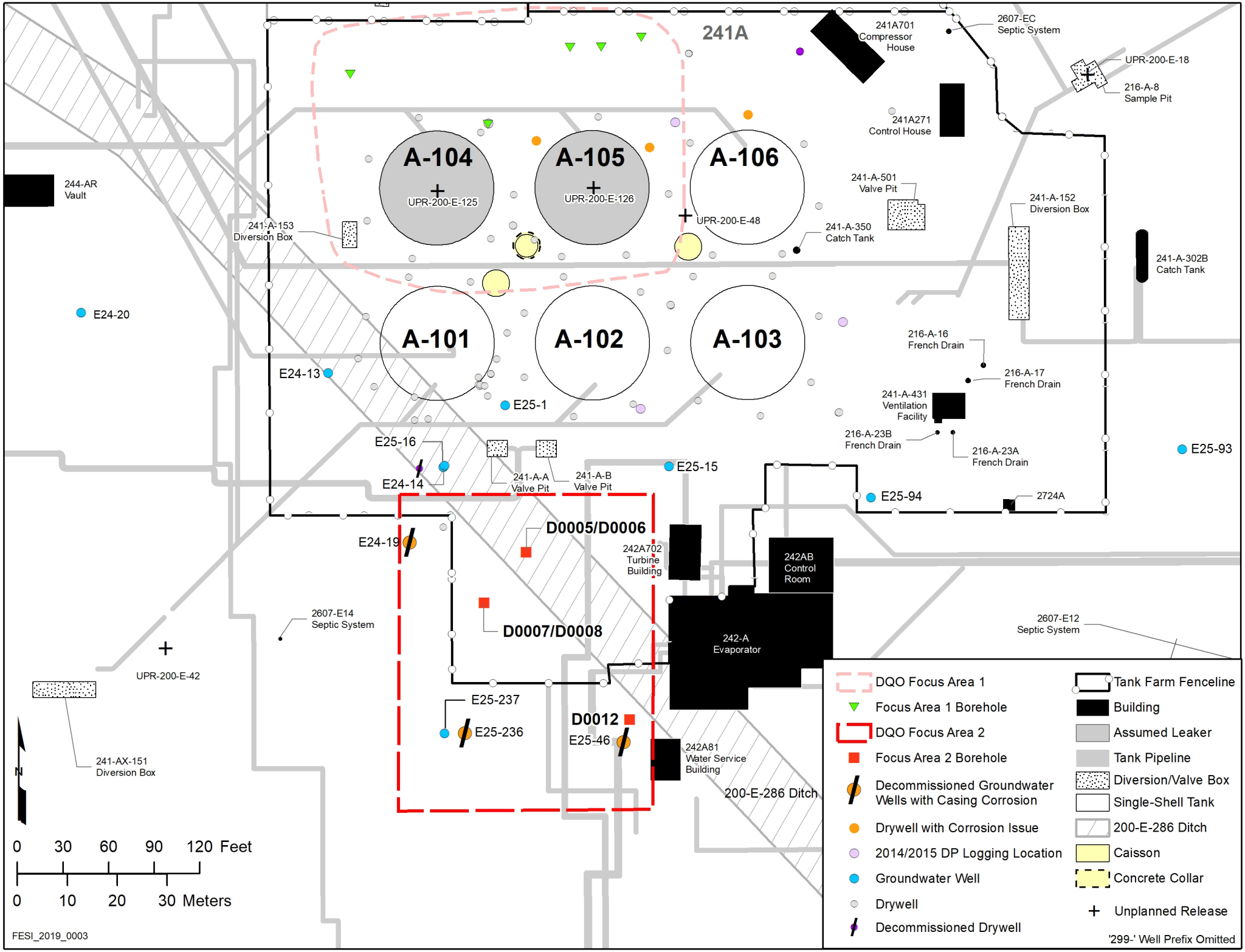
Ms. Blackwell said DOE-ORP would support that option. Mr. Rutland said there wasn't enough time to gather information on other drilling technologies before the project would need to complete characterization at D0006. He is not in favor of this new option. Ms. Tabor clarified that we would perform the research and go back to D0006 once a new drilling technology identified. Mr. Rutland was ok with that. Mr. Lindberg was also ok with this new option.

Mr. Barnes is still adamant on Option b (repush at D0006A now). Mr. Lyon said he would not over-rule Mr. Barnes (the WMA A-AX Project Manager). Mr. Rutland noted that Ecology is leaning towards repushing D0006A, and said WRPS and DOE-ORP need to discuss the decision with management and get back to Ecology on a final decision.

Attachment 3 of these notes provides an email from Ms. Tabor identifying that it was agreed that the path forward was Option b and that one more push would be performed (D0006A).

Becky Blackwell	REBECCA BLACKWELL Digitally signed by REBECCA BLACKWELL Date: 2021.01.12 14:26:54 -08'00'	
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Michael W Barnes	Michael W Barnes	1-15-21
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

Attachment 1


241A
241A701
Compressor
House
2607-EC
Septic System
UPR-200-E-18
216-A-8
Sample Pit
241A271
Control House
A-104
UPR-200-E-125
A-105
UPR-200-E-126
A-106
UPR-200-E-48
241-A-501
Valve Pit
241-A-152
Diversion Box
241-A-350
Catch Tank
241-A-153
Diversion Box
244-AR
Vault
241-A-302B
Catch Tank
E24-20
A-101
A-102
A-103
216-A-16
French Drain
216-A-17
French Drain
E24-13
E25-1
241-A-431
Ventilation
Facility
216-A-23B
French Drain
216-A-23A
French Drain
E25-93
E25-16
E24-14
241-A-A
Valve Pit
241-A-B
Valve Pit
E25-15
E25-94
2724A
D0005/D0006
E24-19
242A702
Turbine
Building
242AB
Control
Room
2607-E14
Septic System
D0007/D0008
242-A
Evaporator
2607-E12
Septic System
UPR-200-E-42
E25-237
E25-236
D0012
E25-46
242A81
Water Service
Building
200-E-286 Ditch
241-AX-151
Diversion Box
N
0 30 60 90 120 Feet
0 10 20 30 Meters
FESI_2019_0003
DQO Focus Area 1
Focus Area 1 Borehole
DQO Focus Area 2
Focus Area 2 Borehole
Decommissioned Groundwater Wells with Casing Corrosion
Drywell with Corrosion Issue
2014/2015 DP Logging Location
Groundwater Well
Drywell
Decommissioned Drywell
Tank Farm Fenceline
Building
Assumed Leaker
Tank Pipeline
Diversion/Valve Box
Single-Shell Tank
200-E-286 Ditch
Caisson
Concrete Collar
Unplanned Release
'299-' Well Prefix Omitted

Attachment 2

Path Forward on Casing Breaks at WMA A-AX Focus Area 2 and Direct Push Location D0006 December 10, 2020

The purpose of this meeting is to discuss the reoccurring casing breaks at WMA A-AX Focus Area 2 direct pushes and specifically on the path forward on the D0006 location.

1. Purpose of WMA A-AX Focus Area 2 and Background

"This focus area is being investigated to determine if corrosion of wells in the southwestern area of A Farm is associated with tank waste releases from A Farm." (RPP-PLAN-63020, *Sampling and Analysis Plan for WMA A-AX Focus Area 2 (Southwestern Area of A Farm*)

Approximate depth of casing corrosion at nearby groundwater wells:

- 299-E24-19, 276.6 to 277.7 ft bgs
- 299-E25-46, 274.4 to 278.6 ft bgs
- 299-E25-236, 263 to 267 ft bgs

Note: Focus Area 2 is comprised of two direct push locations (D0005/D0006 and D0007/D0008) and one large diameter borehole/well (D0012), which will be drilled by DOE-RL. The D0012 location will be finalized after construction in the 242-A Evaporator has been completed.

2. Current status

Table 1. Summary of Field Activities At WMA A-AX Focus Area 2

Direct Push ID	Planned Total Depth (ft bgs)	Depth achieved (ft bgs)	Number of samples collected	Number of samples planned	Comment
D0005	290	280.7	-	-	This push met refusal and could not advance to planned depth.
D0006	277	181	11[a]	18	Casing break
D0007	290	290	-	-	
D0008	286	214	11	17	Casing break
D0008A	286	286	9[b]		

[a] Includes surface duplicate sample.
[b] Includes resampling at the surface, 9-11 ft bgs and 12-14 ft bgs.
ft bgs = feet below ground surface.

D0008

The drill string was at 214 ft bgs when the casing broke at 99 ft bgs. DOE-ORP and Ecology discussed re-pushing at a second location designated "D0008A" (additional information on D0008A is included in meeting notes titled *WMA A-AX Focus Area 2 Sample Depth Meeting #2* [available in the administrative record]). All required samples were collected at D0008/D0008A. Table 2 identifies the number of samples that have already been collected at D0008.

Table 2. Samples Collected from D0008/D0008A

Planned Sample Depth (ft bgs)	Comment
Surface (0-1)	
Resampled Surface (0-1)	Collected from D0008A
9-11	
Resampled 9-11	Collected from D0008A
12-14	
Resampled 12-14	Collected from D0008A
22-24	
24-26	Special Study sample interval to PNNL
69-71	
71-73	Special Study sample interval to PNNL
130-132	
132-134	Special Study sample interval to PNNL
187-189	
189-191	Casing broke at D0008 as crew was pushing the sample interval. Special Study sample interval to PNNL. Collected from D0008A.
262-264	Collected from D0008A
264-266	Collected from D0008A. Special Study sample interval to PNNL.
276-278	Collected from D0008A
278-280	Collected from D0008A. Special Study sample interval to PNNL.
282-284	Collected from D0008A
248-286	Collected from D0008A. Special Study sample interval to PNNL.

ft bgs = feet below ground surface.
PNNL = Pacific Northwest National Laboratory.

D0006

The drill string was at 181 ft bgs when the casing broke at 134 ft bgs. Table 3 identifies the number of samples that have already been collected at D0006.

Table 3. Samples Collected at D0006

Planned Sample Depth (ft bgs)	Comment
Surface (0-1)	
Surface Duplicate (0-1)	
7-9	
12-14	
20-22	
22-24	Special Study sample interval to PNNL
79-81	
81-83	Special Study sample interval to PNNL
132-134	
134-136	Special Study sample interval to PNNL
179-181	Casing broke as crew was pushing the subsequent sample interval.

ft bgs = feet below ground surface.
PNNL = Pacific Northwest National Laboratory.

The following sample depth intervals have not been collected:

- 181-183 ft bgs (Special Study sample interval to PNNL)
- 204-206 ft bgs
  - 206-208 ft bgs (Special Study sample interval to PNNL)
- 260-262 ft bgs
  - 262-264 ft bgs (Special Study sample interval to PNNL)
- 273-275 ft bgs
  - 275-277 ft bgs (Special Study sample interval to PNNL)

3. Additional information on casing breaks at D0006 and D0008

After the casing broke in D0006, the following evaluations were initiated:

- The broken casing from D0008 was sent to vendor (Mavrik) for retesting and inspection with results showing required hardness range and thread inspections were well within tolerance.
- Two pieces of unused casing (stored casing) were transported to Mavrik for hardness retesting.
    - One tested within tolerance and the other tested out of tolerance.
- Based on these test results, Atkins shipped 600 feet of stored casing back to Mavrik to retest for hardness on 12/01/2020.
    - Available results show that tolerance is above, below and at specifications.
- Material Scientist with metallurgy expertise were asked to review information. They indicated that the following:
    - Fatigue is highly suspected.
    - Flexing of direct push casing causes significant extra stresses.

4. Options for path forward

Note: During DQO and sample depth meetings with Ecology, DOE-ORP identified that the program would try to push deeper but noted that this was pushing the limit of this technology and there may be issues.

a. No more attempts to push at D0006
Issues:

- Potential data gaps – there will not be deeper samples from this location; however, the deeper samples have been collected at D0008/D0008A and will be collected at D0012. Therefore, two of the three locations in Focus Area 2 will have deeper samples.

b. One more attempt – push D0006A and attempt to collect the remaining samples
Issues:

- High possibility of another breakage and therefore, additional casing would remain in the ground.
- Even with another attempt, we still may not be able to collect deeper samples.
    - Potential data gaps – there will not be deeper samples from this location; however, the deeper samples have been collected at D0008/D0008A and will be collected at D0012. Therefore, two of the three locations in Focus Area 2 will have deeper samples.

Attachment 3

From:	Tabor, Cynthia L
To:	Barnes, Michael; Lindberg, Jon (ECY); Skorska, Maria; Kim Schuyler; Schuyler, Kimberly A; Adams, Andrea (ECY); Blackwell, Rebecca I (Becky)
Cc:	Lyon, Jeffery; Rutland, Paul L; Lobos, Rodrigo A
Subject:	RE: WMA A-AX Focus Area 2 D0006 Path Forward

Hi All
We regrouped after our meeting today and agreed to make one more push attempt at D0006 to collect the remaining deep samples – the new location will be D0006A. So this is option b that Mike Barnes and Jon Lindberg wanted.

Thank you for your time and input. If there are any questions, please let me know.
Cindy

CYNTHIA TABOR | SCIENTIST
CLOSURE & CORRECTIVE MEASURES
(509)373-3981
washington river protection solutions
|
CONTRACTOR TO THE UNITED STATES DEPARTMENT OF ENERGY

-----Original Appointment-----
From: Tabor, Cynthia L
Sent: Thursday, December 3, 2020 12:28 PM
To: Tabor, Cynthia L; miba461@ecy.wa.gov; Lindberg, Jon (ECY); Skorska, Maria; Schuyler, Kim gofreestone; Schuyler, Kimberly A; Adams, Andrea (ECY); Blackwell, Rebecca I (Becky)
Cc: Lyon, Jeffery (ECY); Rutland, Paul L; Lobos, Rodrigo A
Subject: WMA A-AX Focus Area 2 D0006 Path Forward
When: Thursday, December 10, 2020 11:30 AM-12:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams Meeting

Hi All
We have had a casing break at another location in Focus Area 2. We would like to meet with you all to discuss the path forward. We will discuss how many samples have been collected…the purpose of the study….where the pipe break occurred etc.

Look forward to talking with you all next week. Hope you had a lovely Thanksgiving.
Cindy

Microsoft Teams meeting

Join on your computer or mobile app
Click here to join the meeting

Join with a video conferencing device

197920091@teams.bjn.vc
Video Conference ID: 115 644 956 4
Alternate VTC dialing instructions

Or call in (audio only)

+1 509-931-1284,,898014801# United States, Spokane

Phone Conference ID: 898 014 801#
Find a local number | Reset PIN

Learn More | Meeting options
