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SX POREWATER EXTRACTION TEST MEETING MINUTES
FISCAL YEAR 2013

This package contains summary notes from the following meetings:

- February 12, 2013, Sample Selection Meeting for Location C8760
- February 21, 2013, Sample Selection Meeting for Location C8762
- August 1, 2013, Extraction Well and Screen Depth Selection Meeting

R Douglas Hildebrand	R D Hildebrand	8-28-2013
DOE Project Manager (print)	DOE Project Manager (signature)	Date
Maria Skorska	M Skorska	9-8-13
Ecology Project Manager (print)	Ecology Project Manager (signature)	Date

MEETING NOTES

SX Pore-Water Extraction Test – Location C8760 Sample Depths

MEETING DATE: February 12, 2013

LOCATION: Washington State Department of Ecology, Richland Office

ATTENDEES:

Mike Barnes (Ecology)	Dan Parker (WRPS)
Maria Skorska (Ecology)	Harold Sydnor (WRPS)
Joe Caggiano (Ecology)	Mike Truex (PNNL)
Kent Reynolds (Energy Solutions)	Cindy Tabor (WRPS)
R.D. Hildebrand (DOE)	Mart Oostrom (PNNL)
Melissa Holm (WRPS)	Les Fort (WRPS)
Ann Shrum (WRPS)	Susan Eberlein (WRPS)

BACKGROUND: This meeting was part of the continuing effort to ensure communication between Ecology and DOE representatives regarding the field work associated with interim measures. Specifically, discussion pertained to the proof of principle test south of SX that is being performed to determine if vadose zone pore-water extraction using tank farm-deployable equipment is a viable technology for remediation within a tank farm.

The purpose of this meeting was to discuss and reach agreement on the intervals to be sampled at location C8760.

DISCUSSION: Cindy Tabor discussed the field status of the project and identified that the first location, C8757, was pushed three times and met refusal at 11.5 feet below ground surface (ft bgs). It was identified that these three attempts were approximately 3 to 4 feet apart and that ground penetration radar was performed prior to the selection of C8757's location. It was also briefly identified that the reason for refusal might be that concrete was placed in the area. After refusal was met three times, a decision was made to move to the next location, C8759 (the location being discussed in this meeting).

Cindy Tabor also identified that per RPP-PLAN-53808, 200 West Area Tank Farms Interim Measures Investigation Work Plan, a total of three prospective test locations were to sampled, each location having two sample intervals. However since one test location could not be evaluated due to refusal (C8757), meeting attendees might want to consider sampling three intervals at the remaining two test locations. Six samples would then still be collected for the project, as originally planned.

Regarding sample selections for C8759/C8760, Cindy Tabor provided the following information to the meeting attendees:

- A location map showing current and prior direct push efforts in the area near C8759/C8760.
- Field plots and processed spectral gamma and moisture logs for C8759
- Gamma and moisture logs from prior direct push efforts in the area near C8759/C8760
- Analytical results from prior direct push efforts in the area near C8759/C8760
- Information from a nearby ground water well, Well 299-W23-19, located SW of Tank 241-SX-115.

Kent Reynolds explained the use of the logs and noted that the gross gamma logs can indicate geologic change. Generally speaking a lower count rate indicates courser grained material, while a higher count rate indicates finer grained material. It was noted that the moisture logs showed a range of approximately five to 40 percent by volume.

Information from prior investigations in the area of C8759/C8760 was discussed.

- Location C7169/C7170 is approximately 140 ft from C8759/C8760. The highest nitrate concentration in C7170 was 990 µg/g at a depth of 113 to 115 ft bgs. This depth interval would equate to a depth of approximately 104 ft bgs at C8759/C8760.

- Location C7167/C7168 is approximately 96 ft from C8759/C8760. The surface elevation difference between C7167 and C8759/C8760 is approximately 11 ft. The highest nitrate concentration in C7168 was 1,950 µg/g at a depth of 129-131 ft bgs. This depth interval would equate to a depth of approximately 117 ft bgs at C8759/C8760.

- The highest nitrate concentration of 24,000 mg/L in Well 299-W23-19 was at 130 ft bgs. This depth interval would equate to a depth of approximately 120 ft bgs at C8759/C8760.

Based on the available data, two sample depth intervals, approximately 104 to 106 ft bgs, and approximately 122.5 to 124.5 ft bgs, were proposed for discussion:

The interval of 104 to 106 ft bgs showed estimated volumetric moisture content of only 22 percent. Because this moisture was less than the recommended moisture level identified by PNNL (Mike Truex indicated that ~25 percent or more was recommended based on information in PNNL-21882), this sample depth was eliminated as a potential choice.

The interval of 122.5 to 124.5 ft bgs showed estimated volumetric moisture content of 35 percent. This depth is similar to the depths in C7168 and Well 299-W23-19 where higher nitrate and Tc-99 concentrations have occurred. The geology of the interval was also discussed - Cold Creek upper (PPLu) with a uniform grain size above and finer grain below the higher moisture interval, which indicates that it would be a good area to sample.

Additionally, an interval of approximately 140 ft bgs was briefly discussed but was dismissed due to the higher known contamination at the approximately 122.5 to 124.5 ft bgs.

CONCLUSIONS: The consensus agreement was that the interval of approximately 122.5 to 124.5 ft bgs was most promising and that characterizing the area above and below this interval would provide valuable information for test design. It was agreed, therefore; that three cores would be taken "back to back" from approximately 121 to 127 ft bgs (Refer to Table 1 for the summary of rationale). This approach would provide information essential to determining how best to design and set the packer/screen assemblies.

Table 1. Sample Depth for C8760

Location Log Hole/Sample Hole	Sample Depth (ft bgs)	Reason
C8759/C8760	121 – 127 (3 consecutive sample intervals)	• Cold Creek upper (upper Plio-Pleistocene unit [PPLu]) - uniform grain size above and finer grain below a higher moisture interval • 35% moisture (within PNNLs criteria): 122.5 – 122.4 ft bgs • Similar zone to C7168 and 299-W23-19 where higher nitrate and Tc-99 concentrations have occurred

Stratigraphic info
Higher moisture per Processed Log (highest moisture is 40%)
Historical Information

MEETING NOTES

SX Pore-Water Extraction Test – Location C8762 Sample Depths

MEETING DATE: February 21, 2013

LOCATION: Washington State Department of Ecology, Richland Office

ATTENDEES:

Mike Barnes (Ecology)	Dan Parker (WRPS)
Melissa Holm (WRPS)	Harold Sydnor (WRPS)
Marcel Bergeron (WRPS)	Mike Truex (PNNL)
Jacob Throolin (WRPS)	Cindy Tabor (WRPS)
R.D. Hildebrand (DOE)	Susan Eberlein (WRPS)
Les Fort (WRPS)	

BACKGROUND: This meeting was part of the continuing effort to ensure communication between Ecology and DOE representatives regarding the field work associated with interim measures. Specifically, discussion pertained to the proof of principle test south of SX Tank Farm that is being performed to determine if vadose zone pore-water extraction using tank farm-deployable equipment is a viable technology for remediation within a tank farm.

The purpose of this meeting was to discuss and reach agreement on the intervals to be sampled at location C8762.

DISCUSSION: Cindy Tabor led the discussion and provided information to the meeting attendees. Information included:

- A location map showing current and prior direct push efforts in the area near C8761/C8762.
- Field plots and processed spectral gamma and moisture logs for C8759 and C8761.
- Gamma and moisture logs from prior direct push efforts in the area near C8761/C8762.
- Analytical results from prior direct push efforts in the area near C8761/C8762
- Information from a nearby ground water well, Well 299-W23-19, located SW of Tank 241-SX-115.

Information from prior investigations in the area of C8761/C8762 was discussed.

- C7167/C7168 are located approximately 95 ft from C8761/C8762. The surface elevation difference between C7167 and C8761/C8762 is approximately 11 ft. The highest nitrate concentration in C7167/C7168 of 1,950 µg/g was at a depth of 129-131 ft bgs. This depth interval would equate to a depth of approximately 117 ft bgs at C8761/C8762.

- The highest nitrate concentration of 24,000 mg/L in Well 299-W23-19 was at 130 ft bgs. This depth would equate to a depth of approximately 120 ft bgs at C8761/C8762.

The interval of approximately 127 to 128 ft bgs showed estimated volumetric moisture content of approximately 30 to 40 percent. This is within the range PNNL's has recommended based on their studies (~25 percent or more based on information in PNNL-21882). The interval is similar to intervals in nearby boreholes where higher nitrate and Tc-99 concentrations have occurred. The geology of the interval was also discussed - Cold Creek upper (PPLu) with a uniform grain size above and finer grain below the higher moisture interval, which indicates that it would be a good area to sample.

CONCLUSIONS: The consensus agreement was that the interval of approximately 127 to 128 ft bgs was most promising. Obtaining additional information concerning the interval up to approximately 123 ft bgs would be useful in test design. It was agreed, therefore; that three cores would be taken "back to back" from approximately 123 – 129 ft bgs (Refer to Table 1 for the summary of rationale).

Table 1. Sample Depth for C8762

Location Log Hole/Sample Hole	Sample Depth (ft bgs)	Reason
C8761/C8762	123 – 129 (3 consecutive sample intervals)	• Cold Creek upper (PPLu) - uniform grain size above and below higher moisture intervals • Highest moisture peaks overall 30 – 40 % (within PNNLs criteria) • Similar zone to where higher nitrate and Tc-99 concentrations have occurred

Stratigraphic info
Higher moisture per Processed Log (highest moisture is 40%)
Historical Information

MEETING NOTES

SX Pore-Water Extraction Test – Extraction Well and Screen Depth Selection

MEETING DATE: August 1, 2013

LOCATION: Washington State Department of Ecology, Richland Office

ATTENDEES:

Mike Barnes (Ecology)	Dan Parker (WRPS)
Maria Skorska (Ecology)	Harold Sydnor (WRPS)
Joe Caggiano (Ecology)	Mike Truex (PNNL)
Kent Reynolds (Energy Solutions)	Cindy Tabor (WRPS)
R.D. Hildebrand (DOE)	Becky Wiegman (WRPS)

BACKGROUND: This meeting was part of the continuing effort to provide a communication avenue between Ecology and DOE representatives to discuss the field work associated with interim measures. Specifically, discussion pertained to the proof of principle test south of SX that is being performed to determine if vadose zone pore-water extraction using tank farm-deployable equipment is a viable technology for remediation within a tank farm.

The purpose of this meeting was to discuss the four locations pushed for the test and agree upon the:

- Priority of locations to be used for the extraction well
- Depths for the placement of well screens.

DISCUSSION: Cindy Tabor led the discussion and provided information packets to the meeting attendees. Each packet contained:

- A location map showing the four extraction/monitoring well locations (C8823 – C8826) and a nearby characterization borehole (C8761/C8762).
- Field Plots and Processed Spectral Gamma and Moisture logs for borehole C8761
- Field Plots and Processed Spectral Gamma and Moisture Plots for boreholes C8823 – C8826
- Analytical, Soil and Moisture information – Sampled from 123-129 feet below ground surface (ft bgs) for borehole C8762

It was agreed that a moisture peak at a depth of about 128 to 129 ft bgs in well C8823 appeared the most promising for well screen placement. This depth interval has high volumetric moisture content and adequate thickness for the placement of a well screen. Kent Reynolds explained the well screen and packer placement process and how that process would be applied to this borehole. The well screen length was discussed as it relates to the bed thickness needed for sealing above and below the screened interval. Geological and analytical results from the characterization borehole (C8761/C8762) nearby were discussed (Table 1):

Table 1. C8762 Laboratory Analytical and Geological Information

Depth (ft bgs)	Nitrate (ug/g)	Technetium-99 (pCi/g)	Geologic and Moisture
123-125	8.22	ND	Clayey Silt to Sandy Silt Slightly moist to moist
125-127	5.01	ND	Silty Sand to Sand Very slightly moist to slightly moist
127-129	13.8	ND	Sandy Silt to Silty Sand Slightly moist to moist

ND = Not Detected

Mr. Reynolds discussed the apparent difference in depth of the high-moisture peak between the borehole C8825 and the other three boreholes. Mr. Reynolds noted that it is unclear whether the high-moisture peak in borehole C8825 correlates with the same unit represented by the high-moisture peaks in C8823, C8824, and C8826. It was agreed that without other information, it is not possible to tell.

The use of nitrate rather than technetium-99 in pore water as a tracer was discussed. Dan Parker explained that nitrate is an acceptable constituent to use for the test as identified in the 200 West Area Tank Farms Interim Measures Investigation Work Plan (RPP-Plan-53808). Mike Truex confirmed that nitrate will behave like technetium as it is also an anion.

It was agreed that the most promising location for the extraction well was C8823. Dr. Skorska asked if it would be possible to move to another extraction well later during the testing to determine if pore-water extraction works as well at other locations. Mr. Parker responded that such a test is not planned and is not currently in the baseline; however, such a test could be recommended in the test report. Mr. Parker noted that the initial test should lead to recommendations for further testing or barrier construction. The project team will be developing and tracking recommendations for further testing as they arise.

The use of other locations for the extraction well was further discussed if the initial extraction well location fails to produce water. The three remaining locations, which will be used as monitoring wells, are being configured so that any of them, if successfully built and developed, could be used as an extraction well. It was also explained that the monitoring wells are being configured to monitor vacuum and that the spacing of the wells was determined based on PNNL modeling.

CONCLUSIONS: The priority of locations to be used as the extraction well and the approximate top of screen elevations for each of the four well locations was discussed and agreed upon:

- Extraction well priority (highest to lowest) is C8823, C8824, C8826, and C8825. For example, if C8823 proves unusable as an extraction well, the next well in the list (i.e., C8824) will be used as the extraction well.
- Approximate top of the screen depths and elevations for each well are provided below.

Table 2. Extraction Well Screen Placement Information

Well	Approximate Top of Screen Elevation (ft above mean sea level) / Depth (ft bgs)	Rationale
C8823	526.6 / 128	Screen will be centered on moisture peak to provide the best chances for sealing above and below the screen
C8824	526.8 / 128	
C8825	527.3 / 127	
C8826	526.9 / 127	